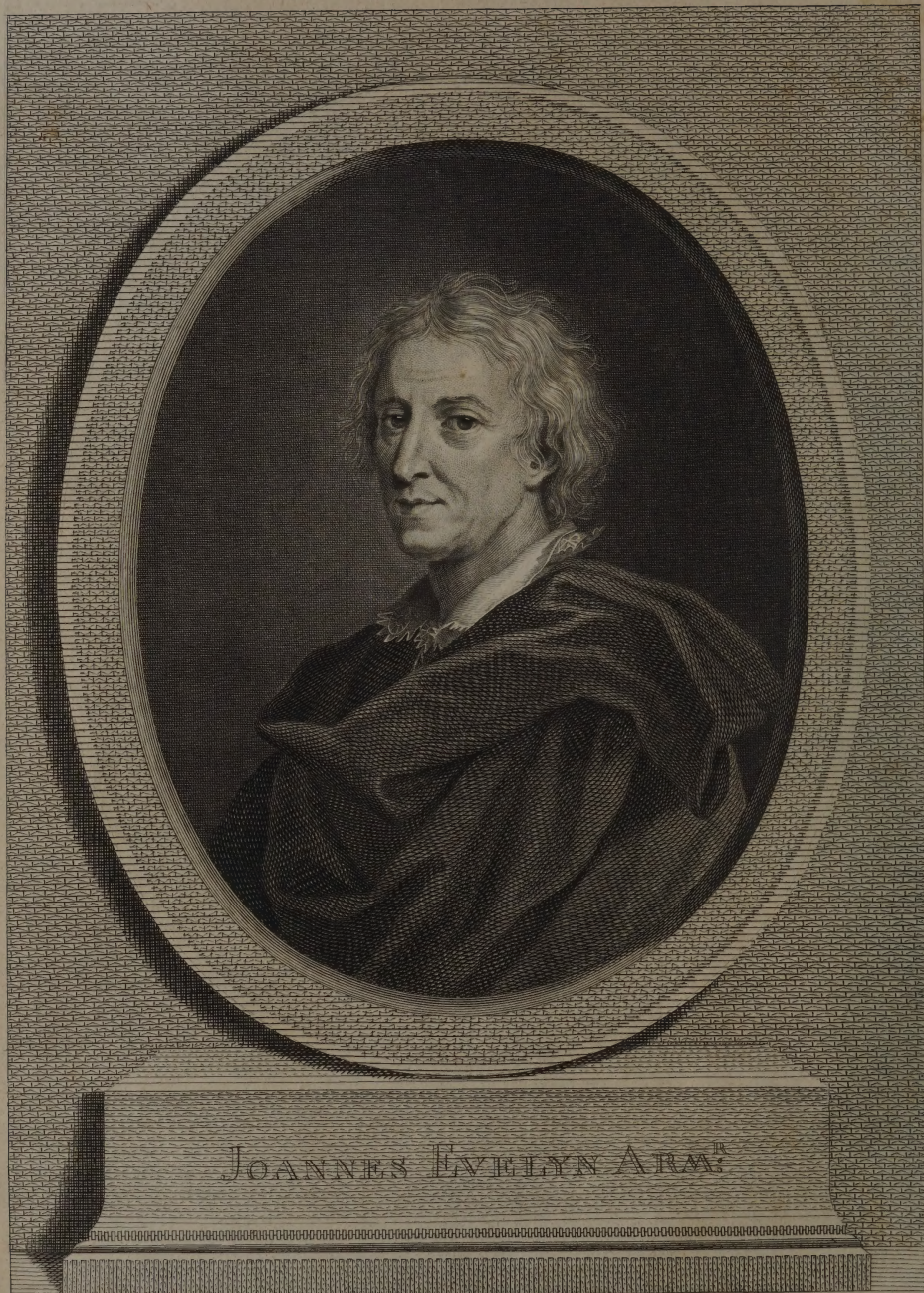




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O F
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A N D T H E

Propagation of TIMBER in his Majesty's Dominions:

As it was delivered in the ROYAL SOCIETY

on the 15th Day of October, 1662,

Upon Occasion of certain Quæries propounded to that illustrious Assembly, by the
Honourable the Principal Officers and Commissioners of the Navy.

T O G E T H E R W I T H

An Historical Account of the Sacredness and Use of
S T A N D I N G G R O V E S.

By J O H N E V E L Y N, Esq;
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With Notes by A. H U N T E R, M. D. F. R. S.

NON CARET UMBRA DEO. — STATIUS.

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M.DCC.LXXVI.

1776

DISCOURSE OF FOREST-TREES AND THE



Propagation of Timber in his Majesty's Dominions:
As it was delivered in the ROYAL SOCIETY
on the 15th Day of October, 1729.
Upon Occasion of certain Oranges presented to the Right Honourable by the
Honourable the Principal Officer and Commissioners of the Navy.

TOGETHER WITH
An Historical Account of the Sacredness and Use of
STANDING GROVES.

BY JOHN EVELYN, ESQ.
Fellow of the Royal Society.
WITH NOTES BY A. HUNTER, M.D.

NEW EDITION, CORRECTED.

LONDON:
Printed by A. MILLAR, in Pall-mall; by J. DODD, in St. Dunstons Church-yard; and by T. BARNARD, in Strand.
MDCCLXXII.

THE EDITOR TO PREFACE

SIR FREDERICK EVELYN BARONET

THIS EDITION OF THE

SILVA

WRITTEN BY HIS ILLUSTRIOUS

ANCESTOR

IN THE YEAR MDCLXIV

IS INSCRIBED

BY HIS MOST OBEDIENT SERVANT

A. HUNTER.

THE EDITOR'S PREFACE.

IT may appear a matter of singularity that a person of my Profession should engage in a work which, it must be confessed, has but a small alliance with Medicine. But I wish to have it known, that, during the whole time this Edition was under my hands, I considered it only as affording amusement, and relaxation from studies of a severer kind. To liberal minds this will be a sufficient apology. To persons of a different turn I have nothing to observe. Tacitus says, *Ad utilitatem vite omnia facta consiliaque nostra sunt dirigenda*. And I could produce proofs of the highest authority to confirm this excellent sentiment;—but an age greedy in pursuit of natural knowledge needs no incitements.

The expence attending this work would have deterred me from the prosecution of it almost as soon as begun, had it not been for a most distinguished Patronage, under whose recommendation the Subscription filled beyond my most sanguine expectations.

Since the first Edition of the *Silva*, in 1664, many improvements have been made in planting, and in every branch of natural knowledge. It, therefore, became my indispensable duty to bring down the improvements to the present time. These make the subject of the Notes, which are drawn from the most respectable authorities. I assume no merit beyond the arrangement of the materials, having in all places preserved the author's own words, excepting in cases where the sense was obscured by an impropriety of expression. To join the sentiments of so many different writers, so as to appear with the uniformity of one Author, required at first a considerable degree of attention, but the composition grew more easy in proportion as the subject became more familiar. To the following Authors I stand particularly indebted: Sir Charles Linnæus, the Rev. Dr. Stephen Hales, the Rev. Mr. Hart, Mr. Bradley, the Rev. Mr. Hanbury, Mr. P. Millar, Mons. Duhamel, and Professor Kalm; and I make this public acknowledgment to avoid the charge of plagiarism. The Philosophical Transactions of London, have, in many instances, been of singular service to me; and I have had frequent occasion to introduce extracts from my own Georgical Essays. I also acknowledge to have received much assistance

THE EDITOR'S PREFACE.

from James Farquarson, Esq; whose excellent Memoir upon the Cultivation of the Scotch Pine is inserted in p. 276—281.

Mr. Speechly, Gardener to his Grace the Duke of Portland, by his Grace's orders, transmitted to me the account published in p. 90—99, describing the method of planting upon his Grace's estates in Nottinghamshire; and I have great satisfaction in being authorized to say, that this most excellent Planter has his Grace's permission to direct Gentlemen in the manner of forming Plantations—for which he is well qualified in all the varieties of soil and situation. From the same judicious Person I am favoured with the supplemental Note inserted in p. 599, describing a method of raising PINES without the use of Tanners' Bark.

I wish to be known to have received favours from Joseph Banks, Esq; whose desire after natural knowledge is not confined within the limits of the habitable world*.

His Grace the Duke of Portland lays me under the greatest obligation, by presenting this work with two most elegant Views of the GREENDALE OAK. Mr. Grimm's delineation of this venerable Tree deserves the highest encomiums; and I have great satisfaction in acknowledging the merits of Messrs. Rooker and Vivares, whose Engravings have done it all imaginable justice. Each View has its Skeleton annexed, that the excellence of the Workmanship might not be injured by the table of menfuration. Mr. John Miller has shewn great elegance and correctness in his department as a Draughtsman and Engraver; and I am singularly obliged to Mr. Bartolozzi for the fine Head of Mr. Evelyn, which stands an unrivalled monument of his excellence as an Artist.

I beg leave to present my warmest acknowledgments to Sir John Ruffel, Bart. and Thomas Frankland, Esq; for their friendly care in overlooking the Artists in their different departments. Without their assistance the plates would have been less worthy of the public approbation.

I esteem myself greatly indebted to William Burgh, Esq; for an elegant Drawing of the COWTHORP OAK. To this Gentleman, and to my most excellent and learned friend the Rev. Mr. Cappe, I am under the highest

* Vide A Voyage towards the North Pole, undertaken by the Hon. Capt. Phipps in the year 1773. Introduction, p. 12.

THE EDITOR'S PREFACE.

obligations for their kind assistance in the elucidation of several obscure passages and corruptions of the text.

Having explained my motives for undertaking this design, and acknowledged my obligations where due, either for civility or information, I have nothing left but to observe, that the liberties I have taken with the Text, in a variety of places, are warranted from a careful Collation of the five Editions with some Original Manuscripts, without which I could not possibly have proceeded with any degree of satisfaction; for of all the books in the English Language, there are, perhaps, none so corrupted as the two last Editions of the *Silva*: The one printed in 1704; the other in 1729.

Soon after the publication of the *Silva*, which made its appearance in 1664 under the Auspices of the Royal Society, the Spirit for Planting increased to a high degree; and there is reason to believe that many of our ships which, in the last war, gave laws to the whole world, were constructed from Oaks planted at that time. The present age must reflect upon this with gratitude; and it is to be hoped that we shall be ambitious to receive from posterity the same acknowledgments that we, at this moment, pay to the memory of our virtuous Ancestors.

York, August 1, 1776.

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T H E

LIFE of Mr. JOHN EVELYN.*

JOHAN EVELYN, the author of this most excellent and laborious work, was born at Wotton in Surry, the seat of his father Richard Evelyn, Esq; upon the 31st of October, 1620. He was descended from a very antient and honourable family, which flourished originally in Shropshire; and was first settled at Wotton, in the reign of Queen Elizabeth. He was instructed in grammar and classical learning at the free-school at Lewes in Suffex; from whence, in the year 1637, he was removed, and entered as a Gentleman-Commoner at Baliol College in Oxford. He remained there for about three years, prosecuting his academical studies with great diligence; and then removed to the Middle Temple in London, in order to add a competent knowledge of the laws of his country to his philological and philosophical acquisitions. Upon the breaking out of the Civil War, he repaired to Oxford; where he obtained leave from King Charles I. under his own hand, to travel into foreign countries for the completion of his education. In the spring of 1644 he left England, in order to make the tour of Europe; which he performed very successfully, making it his business to inquire carefully into the state of the sciences, and the improvements made in all useful arts, wherever he came. He spent some time at Rome, and happened to be there at the time of Laud's death, which gave him an opportunity of vindicating, in some measure, the memory of that honest, but rash and zealous man. "I was at Rome," says Mr. Evelyn, "in the company of divers of the English fathers, when the news of the Archbishop's sufferings, and a copy of his sermon made upon the scaffold, came thither. They read the sermon, and commented upon it, with no small satisfaction and contempt; and looked on him as one that was a great enemy to them, and stood in their way, while one of the blackest crimes, imputed to him, was his being popishly affected."

Mr. Evelyn visited also other parts of Italy, for the sake of improving himself in architecture, painting, the knowledge of antiquities, medals,

* This Life of Mr. Evelyn is taken from the *BIOGRAPHIA BRITANNICA* — and is given nearly in the words of the ingenious Authors of the *BIOGRAPHICAL DICTIONARY*.

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and the like. His early affection to, and skill in the fine arts, appeared during his travels; for we find, that he delineated on the spot the prospects of several remarkable places that lie betwixt Rome and Naples: more particularly, "The Three Taverns, or the Forum of Appius," mentioned in the Acts of the Apostles; "the promontory of Anxur; a prospect of Naples from mount Vesuvius; a prospect of Vesuvius, as it appears towards Naples; the mouth of mount Vesuvius:" all which were engraved from our author's sketches by Hoare, an eminent artist at that time. He returned to Paris in the year 1647; where, being recommended to Sir Richard Browne, Bart. the King's Minister there, he made his addressees to his only daughter Mary, whom he soon after married, and by whom he became possessed of Sayes-Court near Deptford in Kent, where he resided after his return to England, which was about the year 1651. Some time before this he had commenced author; and the following pieces seem to be the first productions of his pen: 1. "Of Liberty and Servitude." 1649, 12mo. Translated from the French. 2. "A Character of England, as it was lately presented in a letter to a Nobleman of France, with reflections on Gallus Castratus." 1651, 16mo. The third edition of this book appeared in 1659: at present it is very scarce. 3. "The State of France." 1652, 8vo. 4. "An Essay on the first book of Lucretius, interpreted, and made into English Verse." 1656, 8vo. This translation was decorated with a frontispiece, designed by his ingenious Lady; and with a panegyric copy of verses by Mr. Waller, prefixed to it. 5. "The French Gardener; instructing how to cultivate all sorts of fruit-trees and herbs for the garden." 1658, and several times after. In most of the editions is added, "The English Gardener vindicated, by John Rose, Gardener to King Charles II. with a tract of the making and ordering of wines in France." The third edition of the "French Gardener," which came out in 1676, was illustrated with copper-plates. 6. "The Golden Book of St. Chrysostom, concerning the Education of Children." 1659, 12mo.

The situation of publick affairs induced Mr. Evelyn to live very retired at Sayes-Court; and so fond was he of this rural retreat, that he seemed determined to enjoy retirement for life. This studious disposition, together with his disgust of the world, occasioned by the violence and confusion of the times, was so strong, that he actually proposed to Mr. Boyle the raising a kind of college for the reception of persons of the same turn of mind; where they might enjoy the pleasure of society, and at the same time pass their days without care or interruption. His letter to Mr. Boyle,

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in which the following plan of a college is contained, is dated the third of September, 1659, and exhibits an agreeable portrait of his philosophic and contemplative mind.

“ I propose the purchasing of thirty or forty acres of land, in some healthy place, not above twenty-five miles from London; of which a good part should be tall wood, and the rest up-land pastures, or downs sweetly irrigated. If there were not already a house, which might be converted, &c. we would erect, upon the most convenient site of this, near the wood, our building, viz. one handsome pavillion, containing a refectory, library, withdrawing-room, and a closet; this the first story: For we suppose the kitchen, larders, cellars, and offices, to be contrived in the half-story under ground. In the second should be a fair lodging-chamber, a pallet-room, a gallery, and a closet; all which should be well and very nobly furnished, for any worthy person that might desire to stay any time, and for the reputation of the college: The half-story above for servants, wardrobes, and like conveniences. To the entry fore front of this court, and at the other back front, a plot walled in, of a competent square for the common seraglio, disposed into a garden; or it might be only carpet, kept curiously, and to serve for bowls, walking, or other recreations, &c. if the company please. Opposite to the house, towards the wood, should be erected a pretty chapel; and, at equal distances, even within the flanking walls of the square, six apartments or cells for the members of the society, and not contiguous to the pavillion; each whereof should contain a small bed-chamber, an outward room, a closet, and a private garden, somewhat after the manner of the Carthusians. There should likewise be an elaboratory, with a repository for rarities and things of nature: an aviary, dove-house, physic-garden, kitchen-garden, and a plantation of orchard-fruit, &c. all uniform buildings, but of single stories, or a little elevated. At convenient distance, towards the solitary garden, should be a stable for two or three horses, and a lodging for a servant or two. Lastly, a garden-house and conservatory for tender plants. The estimate amounts thus: The pavillion, four hundred pounds; the chapel, one hundred and fifty pounds; apartments, walls, and out-housing, six hundred pounds; the purchase of the fee for thirty acres, at fifteen pounds per acre, eighteen years purchase, four hundred pounds. The total, fifteen hundred and fifty pounds: Sixteen hundred pounds will be the utmost. Three of the cells or apartments, that is, one moiety, with the appurtenances, shall be at the dispo-

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“sal of one of the founders, and the other half at the other’s. If I and my
“wife take up two apartments, (for we are to be decently asunder how-
“ever I stipulate, and her inclination will greatly suit with it) that shall be
“no impediment to the society, but a considerable advantage to the eco-
“nomic part: A third shall be for some worthy person. And, to facilitate
“the rest, I offer to furnish the whole pavillion compleatly, to the value of
“five hundred pounds, in goods and moveables, if need be for seven years,
“till there shall be a public stock. There shall be maintained at the
“public charge, only a chaplain well qualified; an antient woman to dress
“the meat, wash, and do all such offices; a man to buy provisions, keep
“the garden, horses, &c. a boy to assist him and serve within. At one
“meal a-day, of two dishes only, unless some little extraordinary upon par-
“ticular days or occasions, (then never exceeding three) of plain and whole-
“some meat; a small refectiion at night; wine, beer, sugar, spice, bread,
“fish, fowl, candles, soap, oats, hay, fuel, &c. at four pounds per week;
“two hundred pounds per annum: Wages, fifteen pounds; keeping the
“gardens, twenty pounds; the chaplain, twenty pounds per annum. Laid
“up in the treasury one hundred and forty-five pounds, to be employed for
“books, instruments, drugs, trials, &c. The total four hundred pounds
“a-year, comprehending the keeping of two horses for the chariot or the
“saddle, and two kine. So that two hundred pounds per annum will be the
“utmost that the founders shall be at to maintain the whole society, consist-
“ing of nine persons, (the servants included) though there should no others
“join, capable to alleviate the expence. But if any of those who desire to
“be of the society be so well qualified as to support their own particulars,
“and allow for their proportion, it will yet much diminish the charge: And
“of such there cannot want some at all times, as the apartments are empty.
“If either of the founders thinks expedient to alter his condition, or that
“any thing do HUMANITUS CONTINGERE, he may resign to another, or sell
“to his colleague, and dispose of it as he pleases, yet so as it still continue
“the institution. ORDERS: At six in summer, prayers in the chapel. To
“study ’till half an hour after eleven. Dinner in the refectory, till one.
“Retire ’till four. Then call to conversation (if the weather invite) abroad,
“else in the refectory. This never omitted but in case of sickness. Pray-
“ers at seven. To bed at nine. In the winter the same, with some abate-
“ments for the hours, because the nights are tedious, and the evening’s
“conversation more agreeable. This in the refectory. All play interdicted,
“sans bowls, chess, &c. Every one to cultivate his own garden. One

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“ month in spring, a course in the elaboratory on vegetables, &c. In the
“ winter, a month on other experiments. Every man to have a key of
“ the elaboratory, pavillion, library, repository, &c. Weekly fast. Com-
“ munion once every fortnight, or month at least. No stranger easily ad-
“ mitted to visit any of the society but upon certain days weekly, and that
“ only after dinner. Any of the society may have his commons to his apart-
“ ment, if he will not meet in the refectory, so it be not above twice a-
“ week. Every Thursday shall be a music-meeting at conversation hours.
“ Every person of the society shall render some public account of his studies
“ weekly, if thought fit; and, especially, shall be recommended the pro-
“ motion of experimental knowledge, as the principal end of the institution.
“ There shall be a decent habit and uniform used in the college. One
“ month in the year may be spent in London or any of the universities,
“ or in a perambulation for the public benefit, with what other orders
“ shall be thought convenient.” *Boyle's Works*, Vol. II.

The moment that a prospect appeared of the King's restoration, our Author quitted Philosophy for Politicks; and, upon an attempt being made to damp the desires of the people for the King's return, he drew his pen in that critical and important season, in defence of the Royal Person and Cause. The title of his piece was, 7. “ An Apology for the Royal Party, written in a letter to a person of the late Council of State; with a touch at the pretended Plea of the Army.” 1659, 4to. This pamphlet had a good effect, and was generally so well received, that it ran through three impressions that year. Soon after came out a piece, intitled, “ News from Brussels, in a letter from a near attendant on his Majesty's Person, to a person of honour here, dated March 10, 1659.” The design of this pretended letter was to represent the character of King Charles II. in as bad a light as possible; and intended to destroy the impression which had been propagated to his advantage. All the King's friends were extremely alarmed at this attempt, and Mr. Evelyn as much as any of them; who, to furnish an antidote to this poison with all possible speed, sent abroad, in a week's time, a complete answer, which bore the following title: 8. “ The late News or Message from Brussels unmasked.” 1659, 4to.

Immediately after the King's return, Mr. Evelyn was introduced to, and graciously received by him; nor was it long before he received a very singular mark of the King's esteem for, and confidence in him: for he was chosen by his Majesty to draw up “ A narrative of a dispute and quarrel

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“for Precedence, which happened between the Spanish and French Ambassadors,” and which would have occasioned a war between those nations, if the King of Spain, though he gained the better in the present scuffle, had not agreed to yield precedence to the French upon all future occasions without any dispute. Mr. Evelyn began now to enter into the active scenes of life, but yet without bidding adieu to his studies; on the contrary, he published, in the space of a few months, no less than four pieces: as, 9. “A Panegyric at his Majesty King Charles the Second’s Coronation, 1661,” folio. 10. “Instructions concerning the erecting of a Library, translated from the French of Gabriel Naudé, with some improvements by himself,” 1661, 8vo. 11. “Fumifugium; or the inconveniencies of the air and the smoke of London dissipated, together with some remedies humbly proposed,” 1661, 4to. This was addressed to the King and Parliament, and published by his Majesty’s express command. 12. “Tyrrannus; or the Mode: in a discourse of sumptuary laws,” 1661, 8vo. In the year 1662, when the Royal Society was established, Mr. Evelyn was appointed one of the first Fellows and Council. He had given a proof the same year, how well he deserved that distinction, by a small but excellent work, intitled, 13. “Sculptura; or, the History and Art of Chalcography and Engraving in Copper, with an ample enumeration of the most renowned Masters and their works: To which is annexed a new manner of engraving or mezzotinto, communicated by his Highness Prince Rupert to the Author of this treatise.” 1662, 12mo. A second edition of this work, which was become exceedingly scarce and dear, was printed in 1755, 12mo; “containing some corrections and additions taken from the margin of the author’s printed copy, an etching of his head, an exact copy of the Mezzotinto done by Prince Rupert, a translation of all the Greek and Latin passages, and memoirs of the Author’s life.”

Upon the first appearance of the nation’s being obliged to engage in a war with the Dutch, the King thought proper to appoint Commissioners to take care of the sick and wounded; and Mr. Evelyn was one of the number, having all the ports between Dover and Portsmouth for his district. This was in 1664; within the compass of which year his literary labours were not only as great, but even greater, than in any of those preceding. This arose from his earnest desire to support the credit of the Royal Society; and to convince the world, that philosophy was not barely an amusement, fit only to employ the time of melancholy and speculative people, but an high and useful science, worthy the attention of men of the

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greatest parts, and capable of contributing in a supreme degree to the welfare of the nation. With this view he published, 14, "Silva: or, a Discourse of Forest-trees, and the Propagation of Timber in his Majesty's Dominions: To which is annexed, Pomona: or, an Appendix concerning Fruit-trees, in relation to cyder; the making and several ways of ordering it." 1664, folio. This most valuable work was written at the request of the Royal Society, "upon occasion," as the title tells us, "of certain queries propounded to that illustrious assembly by the honourable the principal Officers and Commissioners of the Navy;" and published by their order. It has undergone several editions; a second in 1669; a third in 1679, with great additions and improvements; a fourth in 1705, still considerably augmented; and a fifth in 1729, with all the lesser pieces of our Author, relating to Agriculture and Gardening annexed, as they were in the fourth. But these two last editions are extremely incorrect.

As a diligent perusal of this last useful treatise may animate our Nobility and Gentry to improve their estates by the never-failing methods there recommended, so an attentive study of our author's next work may perhaps contribute to improve their taste in building. It is intitled, 15, "A Parallel of the antient Architecture with the modern, in a collection of ten principal authors, who have written upon the five orders, viz. Palladio and Scamozzi, Gerlio and Vignola, D. Barbaro and Cataneo, L. B. Alberti and Viola, Bullart and De Lorme, compared with one another. The three orders, Doric, Ionic, and Corinthian, comprise the first part of this treatise; and the two Latin, Tuscan and Composite, the latter. Written in French by Rowland Freart, Sieur de Chambray; made English for the benefit of Builders. To which is added, an account of Architects and Architecture, in an historical and etymological explanation of certain terms, particularly affected by Architects. With Leo Baptista Alberti's Treatise of Statues." 1664, folio. This work, as well as the former, is dedicated to King Charles II. A second edition of it was published in 1669; a third in 1697; and a fourth in 1733, to which is annexed "The Elements of Architecture, collected by Sir Henry Wotton, and also other large additions." 16. *Μυστήριον τῆς Ανομιᾶς*: "that is, another part of the Mystery of Jesuitism; or the new Heresy of the Jesuits, publickly maintained at Paris in the College of Clermont, the 12th of December, 1661, declared to all the Bishops of France, according to the copy printed at Paris; together with the imaginary heresy, in three letters: with divers other particulars

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"relating to this abominable mystery, never before published in English." 1664, 8vo. This is the only piece of a controversial turn among Mr. Evelyn's works. It has not indeed his name to it: But that it is really his, we learn from a letter written by him to Mr. Boyle. 17. "Kalendarium Hortense; or, the Gardener's Almanac, directing what he is to do monthly throughout the year, and what fruits and flowers are in prime." 1664, 8vo. The second edition of this book was dedicated to Mr. Cowley, with whom our author maintained a long and inviolable friendship; and it occasioned Mr. Cowley to address to him his mixt essay in prose and verse, intitled "The Garden." The *Kalendarium Hortense* went thro' a vast number of editions. The author made additions to it as long as he lived, so that the best is that which was printed by way of appendix to the fourth and last edition of the *SILVA* in his life-time, which is also in the fifth edition of that work printed after his decease.

About this time the university of Oxford received a noble and lasting testimony of Mr. Evelyn's gratitude to the place of his education; for it was he who prevailed with the Lord Henry Howard to bestow the Arundelian marbles, then remaining in the garden of Arundel-house in London, on that university. Lord Howard was also strongly importuned by Mr. Evelyn to send to Oxford an exquisite statue of Minerva; but the sudden death of that Lord prevented its removal from Arundel-house in the Strand. Mr. Evelyn spent his time at this juncture in a manner as pleasing as he could wish: He had great credit at court, and great reputation in the world; was one of the commissioners for rebuilding St. Paul's, attended the meetings of the Royal Society with great regularity, and was punctual in the discharge of his office as a commissioner of the sick and wounded. Yet, in the midst of his employments, he found leisure to add fresh labours to those he had already published: As, 18. "The History of the three late famous Impostors, viz. Padre Ottomano, pretended son and heir to the late Grand Signior; Mahomet Bei, a pretended Prince of the Ottoman family, but in truth a Wallachian counterfeit; and Sabbata Levi, the supposed Messiah of the Jews, in the year 1666; with a brief account of the ground and occasion of the present war between the Turk and Venetian: Together with the cause and final extirpation, destruction, and exile of the Jews out of the Empire of Persia." 1668, 8vo. These little histories abound with curious facts; many of which, Mr. Evelyn says, he received from the mouth of a Persian stranger of quality, who had lately resided in Lon-

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don. This work was highly commended in the *Acta Eruditorum Lipsienſium* for the year 1690, with this remarkable circumstance, that the pretended Mahomet Bei was at that very time in the city of Leipzig. Sir George Mackenzie, an admired essay-writer of that age, having written "A Panegyric on Solitude," our author, by way of antidote, published a piece, intitled, 19. "Public Employement and an active Life, with all its Appanages, preferred to Solitude." 1667, 12mo. 20. "An Idea of the Perfection of Painting, demonstrated from the principles of art, and by examples conformable to the observations which Pliny and Quintilian have made upon the most celebrated pieces of the ancient painters, paralleled with some works of the most famous modern painters, Leonardo da Vinci, Raphael, Julio Romano, and N. Pouſſin: Written in French by Rowland Freart, and now translated." 1668, 12mo.

In the year 1669, Mr. Evelyn made a journey to Oxford, where he was honoured with a doctor of law's degree, as a mark of gratitude for the credit and services he had done them. To say the truth, he obtained all his honours without any sollicitation of his own. Thus, when King Charles II. in order to promote trade, thought proper to erect a board for that purpose, and named several persons of great rank to be members of that council, he likewise appointed Mr. Evelyn to be amongst them; who, to express his gratitude for the favour, digested, in a short and plain discourse, the chief heads of the history of trade and navigation, and dedicated it to the King. The title of it runs thus: 21. "Navigation and Commerce; their original and progress: Containing a succinct account of traffic in general; its benefits and improvements; of discoveries, wars, and conflicts at sea, from the original of navigation to this day; with special regard to the English nation; their several voyages and expeditions, to the beginning of our late differences with Holland: In which his Majesty's title to the dominion of the sea is asserted against the novel and later Pretenders." 1674, 12mo. The Royal Society having ordered that every member of the council should in his turn pronounce, at their several meetings, a discourse on some subject of experimental philosophy, Mr. Evelyn presented them with a treatise, intitled, 22. "TERRA: A Philosophical Discourse of Earth, relating to the culture and improvement of it for vegetation, and the propagation of plants," which was printed in 1675, in folio and 8vo. The winter of 1683 being memorably severe,

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the fine plantations of our author at Sayes-Court suffered irreparable damage; of which he gave a philosophical and pathetic account to the Royal Society the succeeding spring. But the Czar of Muscovy, who afterwards resided in this house of Mr. Evelyn, for the sake of being near Deptford-yard, is said to have committed almost as great devastations on his delicious garden as this lamentable frost.

After the accession of King James II. we find Mr. Evelyn, in December 1685, appointed, with Lord Viscount Tiviot and Colonel Robert Philips, one of the Commissioners for executing the office of Lord Privy-seal, in the absence of Henry Earl of Clarendon, Lord Lieutenant of Ireland; which place he held till the 11th of March, 1686, when the King was pleased to make Henry Baron Arundel, of Wardour, Lord Privy-seal. He wrote nothing during this reign. After the revolution, he was made Treasurer of Greenwich Hospital; and, though he was then much in years, yet he continued to publish treatises upon several subjects: As, 23. "Mundus Muliebris; or, the Lady's Dressing-Room unlocked, and her Toilet spread. In burlesque. Together with the Fop-Dictionary, compiled for the use of the fair sex." 1690, 4to. 24. "Monsieur de la Quintinye's Treatise of Orange-Trees, with the raising of Melons, omitted in the French Editions, translated into English." 1693. 25. "Numismata: A Discourse of Medals, antient and modern, together with some account of heads and effigies of illustrious and famous persons, in sculps and taille-douce, of whom we have no medals extant, and of the uses to be derived from them. To which is added, a digression concerning Phisiognomy." 1697, folio. The connoisseurs look on this treatise as one of the perfectest on the subject in any language; and it is said to be greatly admired by foreigners of taste. We are now arrived at the last publication with which our author enriched the republic of letters; and it is intitled, 26. "Acetaria; or, a Discourse of Sallets." 1699, 12mo. It was dedicated to the Lord Chancellor Somers, at that time President of the Royal Society: And, though Mr. Evelyn was then in his eightieth year, it bears no marks of extreme age or impaired abilities.

Nor had Mr. Evelyn been less generous in imparting his knowledge to others out of his own private collections, than by what he had published for the use of all. He communicated to Mr. Boyle a curious and exact account of the method by which the magazines of snow are preserved in

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Italy for the use of the tables of the great. The late learned Bishop of London, Dr. Gibson, was furnished by him with those additional remarks on the county of Surry, which are published in his English edition of Camden's Britannia. He contributed largely to Mr. Houghton's "Husbandry and Trade improved;" and Mr. Aubrey has testified how often he was indebted to him for his friendly assistance in many of his undertakings. In regard to the Royal Society, he was very assiduous in transmitting to them whatever fell within the compass of his inquiries, and used to style himself, humbly, "A pioneer in the service of the Royal Society." He certainly removed many obstructions, and smoothed the roads that led directly to the temple of wisdom and truth. When we consider the number of books he published, and the variety of the subjects on which he employed his time, it is impossible to forbear wondering at his industry and application; and our wonder must be greatly heightened, when we reflect how careful he was in reviewing, correcting, and augmenting all his original works. But this is not all; for he left behind him unfinished, or at least unpublished, works of a more extensive nature than those that are printed, which had cost him incredible pains, and for which he had made prodigious collections. His great work of all was intended to be called "A General History of all Trades;" of which we have an account in one of his own letters to Mr. Boyle, where he assigns the reasons for laying it aside. But though he desisted from the original plan, yet it was not till he had finished several parts of it; particularly his Chalcography, which Mr. Boyle prevailed on him to publish, and the following pieces, which he never published: "Five Treatises, containing a full view of the several arts of painting in oil, painting in miniature, annealing in glass, enamelling, and making marble paper;" and "The Plan of a Royal Garden, describing and shewing the amplitude of that part of Georgics which belongs to Horticulture." To these his unpublished works we must add another, mentioned only by Mr. Wood, who gives us nothing concerning it but the following title: "A Treatise of the Dignity of Man."

Full of age and honours, this amiable Author died upon the 27th of February, 1705-6, in the 86th year of his age; and was interred at Wotton, under a tomb of about three feet high of free-stone, shaped like a coffin, with an inscription upon a white marble, with which it is covered, expressing, according to his own intention, that, "Living in an age of ex-

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“traordinary events and revolutions, he had learned from thence this truth,
“which he desired might be thus communicated to posterity: THAT ALL
“IS VANITY WHICH IS NOT HONEST; AND THAT THERE IS NO SOLID WIS-
“DOM BUT IN REAL PIETY.” As to the Elogiums which ingenious and
learned men have bestowed upon Mr. Evelyn, they are as numerous as
they are great. Mr. Cowley, as we have already observed, inscribed his
Poem, called, “The Garden,” to him; and has said the highest things of
him in the preface to it. Mr. Glanville has given a great character of our
Author: “Mr. John Evelyn”, says he, “hath very considerably advan-
“ced the history of fruit and forest-trees, by his *Silva* and *Pomona*; and
“greater things are expected from his preparations for the *Elysium Bri-*
“*tannicum*, a noble design now under his hands. And certainly the in-
“quisitive world is much indebted to this generous Gentleman for his
“very ingenious performances in this kind; as also for those others of
“sculpture, picture, architecture, and the like useful things, with which
“he hath enriched it.” The learned and judicious Mr. Wotton, in his
“Reflections on antient and modern learning,” speaks of Mr. Evelyn
in still higher terms; and says, that “it may be esteemed a small charac-
“ter of Mr. Evelyn’s *Silva*, or Discourse of Forest-trees, to say that it
“outdoes all that Theophrastus and Pliny have left us on that subject;
“for it not only does that and a great deal more, but contains more use-
“ful precepts, hints, and discoveries upon that now so necessary a part
“of our *Res Rustica*, than the world had till then known from all the
“observations of former ages.” Bishop Burnet, acknowledging some
communications from him, styles him “a most ingenious and virtuous
“Gentleman, who is not satisfied to have advanced the knowledge of this
“age by his own most useful and successful labours about planting, and
“divers other ways, but is ready to contribute every thing in his power
“to perfect other men’s endeavours.” Another eminent author, speaking
of his *Numismata*, bestows the following character of that book and its
author: “We might justly have expected, whatever could have been de-
“sired on this subject, from the excellently learned pen of Mr. Evelyn,
“had he bent his thoughts, as was believed, towards the consideration of
“our British coins as well as medals. It now appears that his *Numismata*
“carried him no farther than those larger and more choice pieces that
“are usually called by this latter name, whereon he has indeed treated
“with that accuracy and fineness which became a gentleman and a scho-
“lar.”

The LIFE of Mr. JOHN EVELYN.

By his excellent wife, who survived him about three years, he had five sons and three daughters. Of the latter, one only survived him, Susanna, married to William Draper, of Adfcomb, in Surry, Esq; of the former, all died young except Mr. John Evelyn, the author of many translations both in prose and verse, and of some original compositions in Dryden's Miscellanies. He was the father of Sir John Evelyn, created a Baronet by letters patent, bearing date July 30, 1713, and great grandfather to the present Sir Frederick Evelyn, now residing upon the family estate at Wotton in Surry.

TO THE
KING's Most Sacred MAJESTY,
CHARLES THE SECOND.

FOR to whom, Sir, with so just and equal right should I present the fruits of my labours, as to the Patron of that Society, under whose influence it was produced, so to whose auspices alone it owes the favourable acceptance which it has received in the world? To you then, Royal Sir, does this Fourth Edition continue its humble addressees, *tanquam Nemorum Vindici*; as of old, they paid their devotions *Herculi & Silvano*; since you are our *Θεὸς ὑμῶν Nemorensis Rex*; as having once your Temple, and Court too, under that sacred Oak which you consecrated with your presence, and we celebrate, with just acknowledgment to God, for your preservation.

I need not acquaint your Majesty how many millions of timber-trees, beside infinite others, have been propagated and planted throughout your vast dominions, at

THE EPISTLE DEDICATORY.

the instigation, and by the sole direction of this work; because your gracious Majesty has been pleased to own it publickly for my encouragement, who, in all that I here pretend to say, deliver only those precepts which your Majesty has put into practice; as having, like another Cyrus, by your own royal example, exceeded all your predecessors in the plantations you have made, beyond, I dare assert it, all the Monarchs of this nation, since the conquest of it. And, indeed, what more august, what more worthy your Majesty, or more becoming our imitation, than, whilst you are thus solicitous for the publick good, we pursue your Majesty's great example, and, by cultivating our decaying woods, contribute to your power, as to our greatest wealth and safety; since whilst your Majesty is furnished to send forth those Argos and Trojan horses, about this happy island, we are to fear nothing from without it; and whilst we remain obedient to your just commands, nothing from within it.

'Tis now some years past, that your Majesty was pleased to declare your favourable acceptance of a Treatise of Architecture, which I then presented to you, with many gracious expressions, and that it was a most useful piece. Sir, that encouragement (together with the success of the book itself, and of the former editions of this) has animated me still to continue my oblation to your Majesty of these improvements: Nor was it certainly without some provident conduct that we have been thus solicitous to begin, as it were, with materials for build-

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ing, and directions to builders, if due reflection be made on that deplorable calamity, the conflagration of your imperial city; which, nevertheless, by the blessing of God, and your Majesty's gracious influence, we have seen rise again a new and much more glorious Phœnix.

This tribute I now once more lay at the feet of our Royal Founder.

May your Majesty be pleased to be invoked by that no inglorious title, in the profoundest submission of,

Gracious Sir,

Your Majesty's

Ever loyal, most obedient and

Faithful Subject and Servant,

Sayes-Court, }
Dec. 5, 1678. }

J. EVELYN.

T O T H E
R E A D E R.

AFTER what the Frontispiece and Porch of this Wooden Edifice presents you, I shall need no farther to repeat the occasion of this following discourse: I am only to acquaint you, That as it was delivered to the Royal Society by an unworthy member thereof, in obedience to their commands; by the same it is now republished without any farther prospect: And the reader is to know, that if these dry sticks afford him any sap, it is one of the least and meanest of those pieces which are every day produced by that illustrious assembly, and which enrich their collections, as so many monuments of their accurate experiments, and publick endeavours; in order to the production of real and useful theories, the propagation and improvement of natural science, and the honour of their institution. If to this there be any thing subjoined here, which may a while bespeak the patience of the reader, it is only for the encouragement of an industry, and worthy labour, much in our days neglected, as haply reputed a consideration of too fordid and vulgar a nature for Noble Persons and Gentlemen to busy themselves withal, and who oftner find out occasions to fell-down and destroy their woods and plantations; than either to repair or improve them.

But we are not without hopes of taking off these prejudices, and of reconciling them to a subject and an industry which has been consecrated, as I may say, by as good and as great persons as any the world has produced; and whose names we find mingled amongst Kings and Philosophers, grave Senators and Patriots of their country: for such of old were Solomon, Cyrus, and Numa, Licinius, surnamed Stolo, Cato, and Cincinnatus; the Pisos, Fabii, Cicero, the Plinys, and thousands more whom I might enumerate, that disdained not to cultivate these rusticities even with their own hands; and to esteem it no small accession to dignify their titles, and adorn their purple with these rural characters of their affections to plant-

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ing, and love of this part of Agriculture, which has transmitted to us their venerable names through so many ages and vicissitudes of the world.

See Petrarch
de Remed.
utriusque for-
tunæ, Lib. i.
Dial. 57.

That famous answer alone which the Persian Monarch gave to Lyfander, will sufficiently justify that which I have said, besides what we might add out of the writings and examples of the rest: But since these may suffice, after due reproofs of the late impolitick waste and universal sloth amongst us, we should now turn our indignation into prayers, and address ourselves to our better-natured countrymen, that such woods, as do yet remain entire, might be carefully preserved, and such as are destroyed, sedulously repaired: It is what all persons who are owners of land may contribute to, and with infinite delight, as well as profit, who are touched with that laudable ambition of imitating their illustrious ancestors, and of worthily serving their generation. To these my earnest and humble advice should be, That at their very first coming to their estates, and as soon as they get children, they would seriously think of this work of propagation also: for I observe there is no part of husbandry which men commonly more fail in, neglect, and have cause to repent of, than that they did not begin planting betimes, without which they can expect neither fruit, ornament, or delight from their labours. Men seldom plant trees till they begin to be wise, that is, till they grow old, and find, by experience, the prudence and necessity of it. When Ulysses, after a ten years absence, was returned from Troy, and coming home, found his aged father in the field planting of trees, he asked him, "Why, being now so far advanced in years, he would put himself to the fatigue and labour of planting that, of which he was never likely to enjoy the fruits?" The good old man, taking him for a stranger, gently replied: "I plant, says he, against my son Ulysses comes home." The application is obvious and instructive for both old and young: And we have a more modern instance, almost like that of the good old Laertes.—Upon the complaint of learned persons and great travellers, deploring the loss of many rare and precious things, trees and plants, especially instancing the Balsam-tree of Gilead, (now almost, if not altogether, failing, and no more to be found where it grew in great plenty) application is made to young Eperous, to consider it seriously, and to fall a planting while time is before them, with this encouraging exclamation, "Agite, ó Adolescentes, & antequam canities vobis obrepat, stirpes jam alueritis, quæ vobis cum insigni utilitate, delectationem etiam adferent: Nam quemadmodum canities temporis succeßu, vobis insciis, sensim obrepat: Sic natura vobis inserviens edu-

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“cabit quod telluri vestrae coheredetis, modò prima initia illi dederitis, &c.”

PET. BELLONIUS *De neglecta stirpium Cultura. Problema ix.*

My next advice is, that they do not easily commit themselves to the dictates of their ignorant hinds and servants, who are, generally speaking, more fit to learn than to instruct. “Male agitur cum Domino quem Villicus docet,” was an observation of old Cato’s; and it was Ischomachus who told Socrates, discoursing one day upon a like subject, “That it was far easier to make than to find a good husbandman:” I have often proved it so in gardeners, and I believe it will hold in most of our country employments. Country people universally know that all trees consist of roots, stems, boughs, leaves, &c. but can give no account of the species, virtues, or farther culture, besides the making of a pit or hole, casting and treading in the earth, &c. which require a deeper search than they are capable of; we are then to exact labour, not conduct and reason, from the greatest part of them: and the business of planting is an Art or Science, (for so Varro has solemnly defined it) and very different from what many in his time accounted of it; “Facillimam esse nec ullius acuminis Rusticationem,” namely, That it was an easy and insipid study. It was the Simple Culture only, with so much difficulty retrieved from the late confusion of an intestine and bloody war, like that of ours, and now put in reputation again, which made the Noble Poet write,

Vide & Curi-
tium, Lib. vii.
&c.

De R. R.

————— Verbis ea vincere magnum ————— How hard it was
Quàm sit, & angustis hanc addere rebus honorem! Low subjects with illustrious words to grace!
Georg. iii.

Seeing, as the Orator does himself express it, “Nihil est homine libero dignius,” there is nothing more becoming and worthy of a Gentleman, no, not the Majesty of a Consul*. In ancient and best times, men were not honoured and esteemed for the only learned, who were great linguists, profound criticks, readers and devourers of books, but such whose studies consisted of the discourses, documents, and observations of their forefathers, ancient and venerable persons, who (as the excellent author of the rites of the Israelites, chap. xv. &c. acquaints us) were not only obliged to instruct and inform their children of the wonderful things God had done for their Ancestors, together with the precepts of the Moral Law, Feasts, and Religious Ceremonies, but taught them likewise all that concerned Agriculture, joined with lessons of perpetual practice, in which they were, doubtless, exceedingly knowing, whilst, during so many ages, they

In agris erant
tunc Senato-
res. Cic. de
Senect.
* Silvæ sint
Consule dig-
næ. See this of
the Poet inter-
preted by Scalliger. Lib. i.
c. i. Poet.

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employed themselves almost continually in it : And though now-a-days this noble art be for the most part left to be exercised amongst us by people of grosser and unthinking souls, yet there is no science whatever which contains a vaster compass of knowledge, infinitely more useful and beneficial to mankind, than the fruitless and empty notions of the greatest part of speculatists, counted to be the only eruditi and learned men. An Israelite, who, from tradition of his forefathers, his own experience, and some modern reading, had informed himself of the religion and laws which were to regulate his life, and knew how to procure things necessary ; who perfectly understood the several qualities of the earth, plants, and places agreeable to each sort, and to cultivate, propagate, defend them from accidents, and bring them to maturity; that also was skilled in the nature of cattle, their food, diseases, remedies, &c. (which those who amongst us pass for the most learned and accomplished Gentlemen and Scholars, are, for the most part, grossly ignorant of, and look upon as base, rustick, and things below them) is, in this learned author's opinion, infinitely more to be valued than a man brought up either in wrangling at the Bar, or the noisy and ridiculous disputes of our Schools, &c. To this sense the learned Modena. And it is remarkable, that after all that wise Solomon had said, " that All was vanity and vexation of spirit," among so many particulars he reckons up, he should be altogether silent, and say nothing concerning Husbandry ; as, doubtless, considering it the most useful, innocent, and laudable employment of our life, requiring those, who cultivate the ground, to live in the country, remote from city-luxury, and the temptation to the vices he condemns. It was indeed a plain man, a Potter by trade, but let nobody despise him because a Potter, (Agathocles, a King, was of that craft) who, in my opinion, has given us the true reason why Husbandry, and particularly Planting, is no more improved in this age of ours, especially where persons are Lords and owners of much land : The truth is, says he, when men have acquired any considerable fortune by their good husbandry and experience, (forgetting that the greatest Patriarchs, Princes, their sons and daughters, belonged to the plough and the flock) they account it a shame to breed up their children in the same calling which they themselves were educated in, but presently design them Gentlemen : they must, forsooth, have a coat of arms, and live upon their estates ; so as by the time the son's beard is grown, he begins to be ashamed of his father, and would be ready to defy him, that should, upon any occasion, mind him of his honest extraction : And if it chance that the good man have other children to provide for, *This* must be the darling,

Palissy, le
Moyen de de-
venir Riche.

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be bred at school and the university, whilst the rest must to cart and plow with the father. This is the cause, says my author, that our lands are so ill cultivated and neglected: Every body will subsist upon their own revenue, and take their pleasure, whilst they resign their estates to be managed by the most ignorant, the children whom they leave at home, or the hinds to whom they commit them, when, as in truth and in reason, the more learning the better Philosophers; and the greater abilities they possess, the more and the better are they qualified to cultivate and improve their estates. Methinks this is well and rationally argued.

And now you have in part what I had to produce in extenuation of this adventure; that, animated with a command, and assisted by divers worthy persons, (whose names I am prone to celebrate with all just respects) I have presumed to cast in my symbol; which, with the rest that are to follow, may, I hope, be in some degree serviceable to him (whoever the happy person be) that shall oblige the world with that Complete System of Agriculture, which as yet seems a Desideratum, and wanting to its full perfection. This, I assure you, is one of the principal designs of the Royal Society, not in this particular only; but through all the liberal and more useful arts; for which, in the estimation of all equal judges, it will merit the greatest of encouragements; that so at last, what the learned Columella has wittily reproached, and complained of, as a defect in that age of his, concerning Agriculture in general, and is applicable here, may attain its desired remedy and consummation in this of ours.

“Sola enim Res Rustica, quæ sine dubitatione proxima, & quasi con-
 “sanguinea Sapientiæ est, tam discentibus eget, quam magistris: Adhuc
 “enim Scholas Rhetorum, & Geometrarum, Musicorumque, vel quod
 “magis mirandum est, contemptissimorum vitiorum officinas, gulosius
 “condiendi cibos, & luxuriosius fercula struendi, capitumque & capillo-
 “rum concinnatores, non solum esse audiui, sed & ipse vidi; Agricolationis
 “neque Doctores qui se profiterentur, neque Discipulos cognovi.” But
 this I leave for our peruked gallants to interpret, and should now apply
 myself to the directive part, which I am all this while bespeaking, if, after
 what I have said in the several paragraphs of the ensuing discourse upon
 the argument of wood (and which in this edition, coming abroad with in-
 numerable improvements and advantages, so furnished as I hope shall nei-
 ther reproach the author or repent the reader) it might not seem superfluous

Præfat. ad
 P. Silvinum;
 which I ear-
 nestly recom-
 mend to the
 serious perusal
 of our Gentry.

Voluptates
 agricolarum
 mihi ad sapi-
 entis vitam
 proximè vi-
 dentur acce-
 dere. Cic. de
 Senectute.

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to have premised any thing here for the encouragement of so becoming an industry. There are divers learned and judicious men who have preceded me in this argument; as many, at least, as have undertaken to write and compile vast herbals and theatres of plants; of which we have some of our own countrymen, (especially the most industrious and learned Mr. Ray) who have boldly, I dare affirm it, surpassed any, if not all the foreigners: that are extant. In those it is you meet with the description of the several plants, by discourses, figures, names, places of growth, time of flourishing, and their medicinal virtues, which may supply any deficiency of mine as to those particulars; if forbearing the repetition, it should by any be imputed for a defect, though it were indeed none of my design. I say these things are long since performed to our hands; but there is none of these (that I at least know of, and are come to my perusal) who have taken any considerable pains how to direct and encourage us in the culture of forest-trees, the grand defect of this nation, besides some small sprinklings to be met withal in Gervas Markham, Old Tuffer, and, of foreigners, the Country-farm, long since translated out of French, and by no means suitable to our clime and country: Neither have any of these proceeded after my method, and so particularly, in raising, planting, dressing, governing, &c. or so sedulously made it their business to specify the mechanical uses of the several kinds, as I have done, which was hitherto a great Desideratum, and in which the reader will likewise find some things altogether new and instructive; together with directions and encouragements for the propagation of some foreign curiosities of ornament and use, which were hitherto neglected. If I have upon occasion presumed to say any thing concerning their medicinal properties, it has been modestly and frugally, and with chief, if not only, respect to the poor Woodman, whom none, I presume, will envy, that living far from the Physician, he should, in case of necessity, consult the Reverend Druid, his Oaks*, and his Elm, Birch, or Elder, for a short breath, a green wound, or a sore leg, casualties incident to his hard labour. These are the chief particulars of this ensuing work, and what it pretends hitherto of singular, in which, let me be permitted to say, there is sufficient for instruction, and more than is extant in any collection whatsoever (absit verbo invidia) in this way, and upon this subject, abstracting things practicable, of solid use, and material, from the ostentation and impertinences of divers writers, who, receiving all that came to hand on trust with a view to swell their monstrous volumes, have hitherto imposed upon the credulous world, without conscience or

* Nè Silvæ
quidem, hor-
ridiorque na-
turæ facies,
Medicinis ca-
rent, sacra illa
parente rerum
omnium, nus-
quam non re-
media dispo-
nente homini
ut Medicina
fieret etiam so-
litudinis ipsa.

Hinc nata
Medicina.
Hæc sola na-
turæ placuerat
esse remedia
parata vulgo,
inventu facilia,
ac sine impen-
dio, ex quibus
vivimus. Plin.
lib. xxiv.
cap. i.

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honesty. I will not exasperate the adorers of our ancient and late naturalists, by repeating what our Verulam has justly pronounced concerning their rhapsodies, because I likewise honour their painful endeavours, and am obliged to them for much of that I know; nor will I, with some, reproach Pliny, Porta, Cardan, Mizaldus, Cursius, and many others of great name, whose writings I have diligently consulted, because of the knowledge they have imparted to me on this occasion; but I must deplore the time which is, for the most part, so miserably lost in pursuit of their speculations, where they treat upon this argument. The world is now advised, and, blessed be God, infinitely redeemed from that base and servile submission of our noblest faculties to their blind traditions. This, you will be apt to say, is a haughty period; but whilst I affirm it of the past, it justifies, and does honour to the present industry of our age; and of which there cannot be a greater and more emulous instance than the passion of his Majesty to encourage his subjects, and of the Royal Society, his Majesty's Foundation, who receive and promote his dictates, in all that is laudable and truly emolumental of this nature.

It is not therefore that I here presume to instruct him in the management of that great and august enterprize of resolving to plant and repair his ample forests, and other magazines of timber, for the benefit of his royal navy, and the glory of his kingdoms; but to present to his Sacred Majesty, and to the world, what advices I have received from others, observed myself, and most industriously collected from a studious propensity to serve as one of the least intelligences in the ample orb of our illustrious society, and in a work so necessary and important.

And now, since I have mentioned the Society, give me leave, worthy reader, as a member of that body which has been the chief promoter of this ensuing work, to vindicate (as I stand obliged) that assembly, and consequently the honour of his Majesty and the Nation, in a particular which concerns it, though, in appearance, a little foreign to the present subject.

I will not say that all which I have written in the several paragraphs of this treatise is new; but that there are very many new and useful things and observations, (without insisting on the methods only) not hitherto delivered by any author, and so freely communicated, I hope

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will sufficiently appear. It is not therefore in behalf of any particular which concerns myself that I have been induced to enlarge this preface; but, by taking this occasion, to encounter the unsufferable boldness or ambition of some persons, as well strangers as others, arrogating to themselves the being inventors of divers new and useful experiments, justly attributable to several members of the Royal Society.*

So far has that assembly been from affecting glory, that they seem rather to have declined their due; not as ashamed of so numerous and fair an offspring; but as abundantly satisfied that, after all the hard measure and virulent reproaches they had sustained for endeavouring, by united attempts, and at their own charges, to improve real philosophy, they had, from time to time, cultivated that province in so many useful and profitable instances, as are already published to the world, and will be easily asserted to their authors before all equitable judges.

This being the sole inducement of publishing this apology, it may not perhaps seem unreasonable to disabuse some, otherwise, well-meaning people, who, led away and perverted by the noise of a few ignorant and comical buffoons (whose malevolence or impertinences entitle them to nothing that is truly great and venerable) are, with an insolence suitable to their understanding, still crying out, and asking, What have the Society done?

Now, as nothing less than miracles (nor those, unless God should every day repeat them at the call of these extravagants) will convince some persons

* Consult the History of the Royal Society and their Registers. — The laws of motion, and the geometrical straightening of Curve-lines, were first found out by Sir Christopher Wren and Mr. Thomas Neile. — The equated isochrone motion of the weight of a circular pendulum in a paraboloid, for the regulating of clocks, and the improving pocket-watches, by springs applied to the balance, were first invented and demonstrated to this Society by Dr. Hooke; together with all those new and useful instruments, contrivances, and experiments, mathematical and physical, published in his posthumous works by the most accomplished Mr. Waller, Secretary to the Royal Society; and since, those of the incomparably learned Sir Isaac Newton, now President of the Royal Society; Mr. Halley, the worthy Professor of Geometry in the University of Oxford; Dr. Grew, and several more, whose works and useful inventions sufficiently celebrate their merits. I do not mention the Barometer, to which might be added the prodigious effects of the Speculum Urtorium, surpassing what the French confidently, or rather audaciously, pretend to; nor the other admirable inventions, injuriously arrogated by strangers, though due of right to Englishmen, and members of this Society; for it is not the business of this preface to enumerate all, though it was necessary to touch on some instances.

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of the most rational and divine truths, already so often and extraordinarily established, so neither will any thing satisfy these unreasonable men, but the production of the Philosopher's Stone and Great Elixir; which yet were they possessors of, they would consume upon their luxury and vanity.

It is not therefore to gratify these magnificent fops whose talents reach but to the adjusting of their perukes, courting a Miss, or, at the farthest, writing a smutty or scurrilous libel which they would have to pass for genuine wit, that I concern myself in these papers; but, as well in honour of our Royal Founder, as the nation, to assert what by other countries has been surreptitiously arrogated, and by which they not only value themselves abroad, but, prevailing on the modesty of that industrious assembly, seek the deference of those who, whilst it remains still silent, do not so clearly discern this glorious plumage to be purely asceticious, and not a feather of their own.—But still, What have they done?

Those who perfectly comprehend the scope and end of that noble institution, which is to improve natural knowledge, and enlarge the empire of operative philosophy, not by an abolition of the old, but by the real effects of the experimental, collecting, examining, and improving their scattered phenomena, with a view to establish even the received methods and principles of the schools, as far as were consistent with truth and matter of fact, thought it long enough that the world had been imposed upon by that notional and formal way of delivering divers systems and bodies of philosophy, falsely so called, beyond which there was no more country to discover; which being brought to the test and trial, vapours all away in fume and empty sound.

This structure then being thus ruinous and crazy, it is obvious what they were to do; even the same which skilful architects do every day before us, when pulling down the decayed and sinking wall to erect a better and more substantial in its place; they not only take down the old, reject the useless and decayed, but sever such materials as are solid, and will serve again; bring new ones in, prepare and frame a model suitable to so magnificent a design: This Solomon did in order to the building of the material temple, and this is here to be pursued in the intellectual: Nay, here was abundance of rubbish to be cleared, that the area might be free; and then was the foundation to be deeply searched, the materials accurately

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examined, squared, and adjusted before it could be laid: Nor was this the labour of a few; less than a much longer time, more cost and encouragement than any which the Society has yet met withal, could not in reason be sufficient effectually to go through so chargeable a work, and highly necessary.

A long time it was they had been surveying the decays of what was ready now to drop in pieces. Whatever shew the outside made with a noise of elements and qualities, occult and evident; abhorrence of vacuum, sympathies, antipathies, substantial forms, and prime matter courting form; epicycles, Ptolemean hypothesis, magisterial definitions, peremptory maxims, speculative and positive doctrines, and alti-sonant phrases, with a thousand other precarious and unintelligible notions (all which they have been turning over, to see if they could find any thing sincere and useful among this pedantick rubbish, but in vain); here was nothing material; nothing of moment, mathematical or mechanical, and which had not been miserably sophisticated, on which to lay the stress; nothing in a manner whereby any farther progress could be made, for the raising and ennobling the dignity of mankind in the sublimest operations of the rational faculty, by clearing the obscurities, and healing the defects of most of the physiological hypothesis, repugnant, as they hitherto seemed to be, to the principles of real knowledge and experience.

Now, although it was neither in their hopes or in their prospect to consummate a design requiring so mighty aids, environed as they have been with these prejudices, yet have they not desisted from the enterprize; but rather than so noble and illustrious an undertaking should not proceed for want of some generous and industrious spirits to promote the work, they have themselves submitted to those mean employments of digging in the very quarry; yea, even of making brick where there was no straw but what they gleaned, and lay dispersed up and down; nor did they think their pains yet ill-bestowed, if, through the assiduous labour and a train of continual experiments, they might at last furnish, and leave solid and uncorrupt materials to a succeeding and more grateful age, for the building up a body of real and substantial philosophy, which should never succumb to time, but with the ruins of nature, and the world itself.

In order to this, how many, and almost innumerable, have been their trials and experiments, through the large and ample field both of art and

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nature! We call our journals, registers, correspondence, and transactions to witness; and may, with modesty, provoke all our systematical methodists, natural historians, and pretenders, hitherto extant from the beginning of letters to this period, to shew us so ample, so worthy, and so useful a collection. It is a fatality and an injury to be deplored, that those who give us hard words, will not first vouchsafe impartially to examine these particulars, since all ingenuous spirits could not but be abundantly satisfied, that this illustrious assembly has not met so many years purely for speculation only; though I take even that to be no ignoble culture of the mind, or time mispent, for persons who have so few friends and slender obligations to those who should patronize and encourage them: But they have aimed at greater things, and greater things produced. By emancipating and freeing themselves from the tyranny of opinion, delusory and fallacious shews, they receive nothing upon trust, but bring all things to the Lydian touch, make them pass the fire, the anvil, and the file, till they come forth perfectly repurged, and of consistence. They are not hasty in pronouncing from a single, or incompetent number of experiments, the ecstasie *Ευρηκα*, and offer hecatombs; but, after the most diligent scrutiny, and by degrees, and wary inductions honestly and faithfully made, record the truth and event of trials, and transmit them to posterity. They resort not immediately to general propositions upon every specious appearance, but stay for light and information from particulars, and make report *de facto*, and as sense informs them. They reject no sect of philosophers, no mechanick helps, except no persons of men; but cheerfully embracing all, cull out of all, and alone retain what abides the test; that from a plentiful and well-furnished magazine of true experiments, they may in time advance to solemn and established axioms, general rules and maxims; and a structure may indeed lift up its head, such as may stand the shock of time, and render a solid account of the phænomena and effects of nature, the aspectable works of God, and their combinations, so as, by causes and effects, certain and useful consequences may be deduced: Therefore they do not fill their papers with transcripts out of rhapsodists, mountebanks, and compilers of receipts and secrets, to the loss of oil and labour; but, as it were, eviscerating nature, disclosing the resorts and springs of motion, have collected innumerable experiments, histories, and discourses, and brought in specimens for the improvement of Astronomy, Geography, Navigation, Opticks; all the parts of Agriculture, the Garden and the Forest; Anatomy of Plants and Animals; Mines and Oars;

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Measures and Equations of Time, by accurate Pendulums and other Motions; Hydro- and Hygro-Statics, divers Engines, Powers, and Automata; with innumerable more luciferous particulars subservient to human life, of which Dr. Glanvil has given an ample and ingenious account in his learned essay, and since in the posthumous works of Dr. Hooke, lately published by the most obliging Mr. Waller, already mentioned.

This is, Reader, what they have done, and they are but part of the materials which the Society have hitherto amassed and prepared for this great and illustrious work; not to pass over an infinity of solitary and loose experiments subsidiary to it, gathered at no small pains and cost: for so have they hitherto borne the burden and heat of the day alone; sapping and mining to lay the foundation deep, and raise a superstructure to be one day perfected by the joint endeavours of those who shall, in a kinder age, have little else to do, but the putting and cementing of the parts together, which, to collect and fit, have cost them so much sollicitude and care. Solomon indeed built the glorious Temple, but it was David provided the materials: Did men in those days insolently ask, What he had done in all the time of that tedious preparation? I beseech you, what obligation has the Royal Society to render an account of their proceedings to any who are not of the body, especially when they carry on the work at their own expence amidst so many contradictions? It is an evil spirit, and an evil age, which, having sadly debauched the minds of men, seeks with industry to blast and undermine all attempts and endeavours that signify to the illustration of truth, the discovery of imposture, and its sandy foundation.

Neh. ii. 29.

“Those who come,” says the Noble Verulam, “to enquire after knowledge, with a mind to scorn, shall be sure to find matter for their humour, but none for their instruction.” Would men bring light of invention, and not fire-brands of contradiction, knowledge would infinitely increase. These are the Sanballats and Horonites who disturb our men upon the wall; but let us rise up and build, and be no more discouraged. It is impossible to conceive how so honest and worthy a design should have found so few promoters, and so cold a welcome in a nation whose eyes are so wide open. We see how greedily the French and other strangers embrace and cultivate the design: What sumptuous buildings, well furnished observatories, ample appointments, salaries, and accommodations have they erected to carry on the work, whilst we live precariously, and spin the web

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out of our own bowels ! Indeed, we have had the honour to be the first who led the way and given the ferment, which, like a train, has taken fire and warmed the regions all about us. This glory, doubtless, shall none take from us ; but, whilst they flourish so abroad, we want the spirit that should diffuse it here at home, and give progress to so hopeful a beginning : But, as we said, the enemy of mankind has done us this despite ; it is his interest to impeach, in any sort, whatever opposes his dominion (which is to lead and settle men in errors, as well in arts and natural knowledge, as in religion) and therefore would be glad the world should still be groping after both. It is he that sets the buffoons and empty sycophants to turn all that is great and virtuous into raillery and derision : It is therefore to encounter these, that, like those resolute builders, whilst we employ one hand in the work, we, with the other, are obliged to hold our weapon, till some bold and gallant genius deliver us, and raise the siege.

Nel. iv. 27.

How great a name would such a benefactor establish ! What a constellation would he make ! How gloriously would he shine ! For mine own part, religiously I profess it, were I not a person, who (whilst I stood expecting when others more worthy and able than myself should have snatched the opportunity of signalizing a work worthy of immortality) had long since given hostages to fortune, and so put myself out of a capacity of shewing my affection to a design so glorious, I would not only most cheerfully have contributed towards the freeing the Society from the straits it has so long struggled under, but sacrificed all my secular interests in their service. That glory, however, is reserved for the gallant hero, whoever he be, who, truly weighing the noble and universal consequence of so high an enterprize, shall at last free it of these reproaches ; and either set it above the reach of envy, or convert it to emulation.

This were indeed to consult an honest fame, and to embalm the memory of a greater name than any has yet appeared amongst all the benefactors of the disputing sects. Let it suffice to affirm, that, next to the propagation of our most Holy Faith and its appendants, (nor can his Majesty or the Nation build their fame on a more lasting, or a more glorious monument, the propagation of learning and useful arts having always survived the triumphs of the proudest conquerors and spillers of blood) Princes have been more renowned for their civility to Arts and Letters, than to all their sanguinary victories, subduing provinces, and making those brutish desolations in the

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world to feed a salvage and vile ambition. Witness thou Great Alexander, and ye the Ptolemys, Cæsars, Charlemagne, Francis the First, the Cosmos, Fredericks, Alphonfos, and the rest of learned Princes: Since, when all the pomp and noise is ended, there are those little things in black, whom now in scorn you term Philosophers and Fops, to whom you must be obliged for making your names outlast the pyramids, whose founders are as unknown as the heads of the Nile, either because they deserved no memory for their virtues, or had none to transmit them or their actions to posterity.

Is not our Royal Founder already panegyriized by all the Universities, Academists, Learned Persons, divers Princes, Ambassadors, and illustrious Men from abroad? Witness, the many accurate treatises and volumes on the most curious and useful subjects, medicinal, mathematical, and mechanical, dedicated to his Majesty as Founder, to the President, and to the Society, by the greatest wits and most profoundly knowing of the European world, celebrating their institution and proceedings: Witness, the daily submissions and solemn appeals of the most learned strangers to their suffrages, as to the most able, candid, and impartial judges: Witness, the letters and correspondences from most parts of the habitable earth, East and West-Indies, and almost from pole to pole, besides what they have received from the very mouths of divers Professors, Publick Ministers, great Travellers, Noblemen, and Persons of the highest Quality, who have not only frequented the assembly, but desired to be incorporated and ascribed into their number; so little has his Majesty or the Kingdom been diminished in their reputation by the Royal Society, to the reproach of our fordid adversaries.

Never had the Republick of Letters so learned and universal a correspondence as has been procured and promoted by this Society alone, as not only the casual transactions of several years, filled with instances of the most curious and useful observations, make appear; but, as I said, the many nuncupatory epistles to be seen in the fronts of so many learned Volumes. There it is you will find Charles the Second placed among the Heroes and Demi-Gods, for his patrociny and protection. There you will see the numerous congratulations of the most learned foreigners, celebrating the happiness of their institution; and that whilst other nations are still benighted under the dusky cloud, such a refulgent beam should give

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day to this blessed life: And certainly, it is not to be supposed that all these learned persons, of so many and divers interests as well as countries, should speak and write thus out of flattery, much less out of ignorance, being men of the most refined universal knowledge as well as ingenuity; but I should never end were I to pursue this fruitful topic.

I have but one word more to add to conciliate the favour and esteem of our own Universities to an Assembly of Gentlemen, who, from them, acknowledge to have derived all their abilities for these laudable undertakings: Whatever is shining in them of most christian, moral, and otherwise conspicuous, they confess as derived from that source and fountain, to which, on all occasions, they are not only ready to pay the tribute and obsequiousness of humble servants, but of Sons and dutiful Alumni. There is nothing verily which they more desire than a fair and mutual correspondence between so near relations, and that they may be perpetually flourishing and fruitful in bringing forth, as they still do, supplies to Church and State in all its great capacities*. Finally, that they would regard the Royal Society as a Colony of their own planting, and augere its success: And if, in these labours and arduous attempts, several inventions of present use and service to mankind (either detecting errors, illustrating and asserting truths, or propagating knowledge in natural things, and the visible works of God) have been discovered; as they envy not the communicating them to the world, so should they be wanting to the Society, and to the honour of divers learned and ingenious Persons, who are the soul and body of it, not to vindicate them from the ambitious plagiary, the insults of scoffers and injurious men. Certainly, persons of right noble and subacted principles, who are lovers of their country, should be otherwise affected, and rather strive to encourage and promote endeavours tending to so generous a design, than decry it; especially when it costs them nothing but their civility to so many obliging persons, tho' they should hitherto have

* Since this Epistle was first written and published, the University of Oxford has instituted and erected a Society for the promoting of Natural and Experimental Knowledge in concert with the Royal Society, with which they keep a mutual correspondence. This I mention, for that some malevolents had so far endeavoured to possess divers Members of the University, as if the Society designed nothing less than the undermining of that and other illustrious Academies, and which indeed so far prevailed, as to breed a real jealousy for some considerable time; but as this was never in the thoughts of the Society, which had ever the Universities in the greatest veneration, so the innocency and usefulness of its institution has at length disabused them, vindicated their proceedings, dissipated all surmises, and, in fine, produced an ingenuous, friendly, and candid union and correspondence between them.

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entertained them but with some innocent diversions. To conclude, we envy none their dues; nay, we gratefully acknowledge any lights which we receive either from home, or from abroad; we celebrate and record the names of those who give them amongst our benefactors; recommend them to the publick; and what we thus freely give, we hope as freely to receive.

Thus have I endeavoured to vindicate the Royal Society from some aspersions and encroachments it hitherto has suffered, and shewed under what weights and pressure this palm does still emerge; and if for all this I fall short of my attempt, I shall yet have this satisfaction, that tho' I derive no glory from my own abilities, sensible of my great defects, I shall yet deserve their pardon for my zeal to its prosperity.

ΦΙΛΟΣΟΦΙΑΣ ἐπιθυμῆς; παρασκευάζει αὐτόθεν, ὡς καταγελασθησόμενος, ὡς καί αἰκωκισομένων σε πολλῶν ὡς ἐρενίων, ὅτι ἄφρων φιλόσοφος ἡμῖν ἐπανελήλυθε, καὶ πόθεν ἡμῖν αὕτη ἡ ὀφρὺς; σὺ δὲ ὀφρὺν μὲν μὴ σχῆς τῶν δὲ βελτίστων σοι φαινομένων ἕως ἔχει, ὡς ὑπὸ τῷ Θεῷ τελαγμένος εἰς ταύτην τὴν τάξιν μέμνησο δὲ, ὅτι εἰάν μὲν ἐμμένῃς τοῖς αὐτοῖς, οἱ καταγελωνῆς σε πρότερον, ἔτοί σε ὕστερον θαυμάσονταί· εἰάν δὲ ἡτήθῃς αὐτῶν, διπλὴν προσλήψῃ καταγέλωτα. EPICTETUS.

TRANSLATION.

If you resolve to make wisdom and virtue the study and business of your life, you must be sure to arm yourself before-hand, against all the inconveniencies and discouragements that are like to attend this resolution. Imagine, that you shall meet with many scoffs, and much derision; and that people will upbraid you with turning philosopher all on the sudden; and ask in scorn, What is the meaning of all this affected gravity, and these disdainful looks? But be not you affected, or supercilious, only stick close to whatever you are in your judgment convinced is virtuous and becoming; and consider this as your proper station, assigned you by God, which you must not quit upon any terms. And remember, That if you persevere in goodness, those very men, who derided you at first, will afterwards turn your admirers: But if you give way to their reproaches, and are vanquished by them, you will then render yourself doubly, and most deservedly, ridiculous. STANHOPE.

TO THE READER.

“Some men, like Lucian in Religion, seek, by their Wit, to traduce
“and expose useful things, because, to arrive at them, they converse with
“mean experiments; but those who despise to be employed in ordinary
“and common matters, never arrive at solid perfection in Experimental
“Knowledge.” LORD VERULAM.

J. EVELYN.

TO THE READER

ADVERTISEMENT.

AS I have frequently inserted divers historical and other passages, apposite and agreeable to the subject, abstaining from a number more which I might have added, let it be remembered, that I did not altogether compile this work for the sake of our ordinary Rusticks, meer Foresters and Woodmen, but for the benefit and diversion of Gentlemen and persons of Quality, who often refresh themselves in these agreeable toils of Planting and Gardening; for the rest, I may perhaps in some places have made use of here and there a word, not as yet so familiar to every reader; but none, that I know of, which are not sufficiently explained by the context and discourse. That this may yet be no prejudice to the meaner capacities, let them read for

Ablaqueation, laying bare the roots.

Amputation, cutting quite off.

Arborator, pruner, or one that has care of the trees.

Avenue, the principal walk to the front of the house or seat.

Bulbs, round, or onion-shaped roots.

Calcine, burn to ashes.

Compost, dung.

Conservatory, green-house to keep choice plants in.

Contr' Espalier, a palisade, or pole-hedge.

Coronary Garden, flower-garden.

Culinary, belonging to the kitchen, roots, salading, &c.

Culture, dressing.

Decorticate, to strip off the bark.

Emulsion, cleansing it of the moss.

Esulent, roots, salads, &c. fit to eat.

Espaliers, Wall-fruit trees.

Exoticks, outlandish, rare and choice.

Fermentation, working.

ADVERTISEMENT.

Fibrous, stringy.

Fronation, stripping of leaves and boughs.

Heterogeneous, repugnant.

Homogeneous, agreeable.

Hyemation, protection in winter.

Ichnography, ground-plot.

Inoculation, budding.

Incision, grafting.

Insolation, exposing to the sun.

Interlucation, thinning and disbranching of a wood.

Irrigation, watering.

Laboratory, still-house.

Letation, dung.

Lixivium, lee.

Mural, belonging to the wall.

Olitory, belonging to the kitchen-garden.

Palisade, pole-hedge.

Parterre, flower-garden, or knots.

Perennial, continuing all the year.

Quincunx, trees set like the cinque-point of a dye.

Rectify, re-distil.

Seminary, nursery.

Stercoration, dunging.

Tonsile, that which may be shorne or clipped.

Topiary-Works, the clipping, cutting, and forming of hedges, &c. into figures and works.

Vernal, belonging to the spring.

The rest are obvious.

ΕΙΣ ΤΗΝ ΤΟΥ ΠΑΤΡΟΣ

ΔΕΝΔΡΟΛΟΓΙΑΝ.

ΥΜνήσω φρονίμοιο παῖρὸς μελέεσσιν ἐπαίνεσ,
Υμνήσω ἐπέεσσιν ἀριτεύοντα γενεργῶν.

Οὐρανίην ταναΐης ἀρετὴν δρυὸς αὐτὸς ἔγραψεν,

Καὶ ποταπῶν γενεὴν δένδρων κατὰ δάσκιον ὕλην.

Ἀθανάτων κύδιον ἦν νεφεληγερέτα Ζεὺς,

Ἔσχεν δὴ δένδροιο φίλαις παρτίδεσσιν ἑλδῶρ,

Φύλλοις τ' ἀμβροσίοις θαλαεράς, δρυὸς ἐξεφάνωτο.

Ἀγλιακῶν ὅς ἀριτεῖν θεοείκελ ἀνὴρ,

Ἰστορίην δένδρων τέλεσεν φρέσι κυδάλιμοις,

Υλουργὴς, κηπερὸς, ὑπέρροχον, ὅς μὲν ὄνειαρ

Ἀνδράσιν ἐσσομένοις καλὰ γαίην περλυδίττειραν,

Νηυσὶ τε ποντοπόροις βαρυγυῖοις θαλάσσης.

JO. EVELYN, Fil.

S I L V A:
OR, A
D I S C O U R S E
O F
F O R E S T - T R E E S,
A N D

The Propagation of TIMBER in his Majesty's
Dominions, &c.

Tuque ades, inceptumque una decurre laborem,
O decus, ô famæ merito pars maxima nostræ,
CAROLIDE, pelagoque volans da vela patenti:
Da facilem cursum, atque audacibus annue cœptis;
Ignarosque viæ mecum miseratus agrestes,
Ingredere, & votis jam nunc affueſce vocari.

T H E I N T R O D U C T I O N .

1. **S**INCE there is nothing which seems more fatally to threaten a INTROD.
weakening, if not a dissolution, of the strength of this famous
and flourishing nation, than the sensible and notorious decay of
her wooden walls, when, either through time, negligence, or other acci-
dent, the present navy shall be worn out and impaired; it has been a very
worthy and seasonable advertisement in the honourable the principal Offi-
cers and Commissioners, what they have lately suggested to this illustrious
Society for the timely prevention and redress of this intolerable defect.
For it has not been the late increase of shipping alone, the multiplication
of glass-works, iron-furnaces, and the like, from whence this impolitic
diminution of our timber has proceeded; but from the disproportionate
spreading of tillage, caused through that prodigious havoc made by such

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as lately professing themselves against root and branch (either to be reimbursed their holy purchases, or for some other sordid respect) were tempted not only to fell and cut down, but utterly to extirpate, demolish, and raze, as it were, all those many goodly woods and forests, which our more prudent ancestors left standing for the ornament and service of their country. And this devastation is now become so epidemical, that unless some favourable expedient offer itself, and a way be seriously and speedily resolved upon, for a future store, one of the most glorious and considerable bulwarks of this nation will, within a short time, be totally wanting to it *.

NOTES.

* In order to trace the history of the decay of our forest-trees, it will be necessary to remark, that the first attack made upon them, of any material consequence, was in the 27th year of the reign of Henry VIII. when that monarch seized upon the churchlands and converted them, together with their woods, to his own use. Ruinous as such an attempt might appear at first, it did not bring with it any very pernicious consequences, as the whole kingdom, at that early period, was plentifully stocked with all kinds of timber trees, especially the Oak. During the Civil War, which broke out in 1642, and all the time of the Inter-regnum, the Royal Forests, as well as the Woods of the Nobility and Gentry, suffered a great calamity, inasmuch that many extensive forests had, in a few years, hardly any memorial left of their existence but their names. From that period to the present, there is some reason to apprehend that the persons appointed to the superintendence of the Royal Forests and Chaces have not strictly and diligently attended to their charge, otherwise the nation would not at this day have reason to complain of the want of Oak, for the purposes of increasing and repairing the Royal Navy. This loss, however, would not have operated so severely, had the principal Nobility and Gentry been as solicitous to plant, as to cut down their woods. But this reflection should be made with some degree of limitation, as several thousand acres of waste land have, within these twenty years, been planted for the benefit of the rising generation. The Society of Arts, &c. established in London in the year 1754, have greatly contributed, by their honorary and pecuniary premiums, to restore the spirit for planting, and I flatter myself that a republication of Mr. Evelyn's *Silva* will also contribute to that most desirable end. Tusser, a versifier in the reign of Henry the Eighth, complains, at that early period, "that men were more studious to cut down than to plant trees:" and as this Author is often quoted by Mr. Evelyn, it will be proper to remark that his book is entitled *Five hundred points of Husbandry*, and is printed in black letter. It is written in quatrains, or stanzas, of four verses each, and contains more lines than Virgil's *Georgics*. The first edition was published in 1562. There are other editions in 1604, and 1672, in Octavo; also in 1710, and 1743, with notes and observations.—Every thing that has a tendency towards the raising and diffusing a spirit for planting, is highly meritorious; and as our wooden

2. To attain now a spontaneous supply of these decayed materials (which is the vulgar and natural way) would cost (besides the inclosure) some entire ages repose of the plow *, though bread indeed require our first care: therefore the most expeditious and obvious method would doubtless be one of these two ways, sowing or planting. But, first, it will be requisite to agree upon the species; as what trees are likely to be of greatest use, and the fittest to be cultivated; and then, to consider of the manner how it may be best effected. Truly, the waste and destruction of our woods has been so universal, that I conceive nothing less than an universal plantation of all the sorts of trees will supply, and well encounter the defect; and therefore I shall here adventure to speak something in general of them all; though I chiefly insift upon the propagation of such only as seem to be the most wanting and serviceable to the end proposed.

* Patricius,
L. vii. De Re-
pub.

3. And first, by Trees here, I consider principally for the *Genus generatissimum*, such lignous and woody plants as are hard of substance, procure of stature; that are thick and solid, and stiffly adhere to the ground on which they stand †. These we shall divide into the greater and more

NOTES.

walls have been esteemed, for many ages past, the bulwarks of this nation, we may hope, from the goodness of our AUGUST SOVEREIGN, that he will set an example to the Nobility and Men of large possessions, by ordering his wastes to be planted with Timber Trees, especially the Oak.

— nourish there

Those sapling Oaks, which at Britannia's call,

May heave their trunks mature into the main,

And float the bulwarks of her liberty.

MASON.

The wants of the nation call for this supply. How many thousand acres of waste land are there in this kingdom, that at this present time produce nothing, but may be profitably improved by planting! Did Men of large possessions but rightly consider this, they would carefully look over their estates, search out every useless bog, and plant it with poplars or other aquatics. They would examine all the waste grounds and set apart some for the Cottagers, and apply the most barren and useless for plantations. Was such a generous spirit to prevail, we should hear few persons complaining that their ancient Common-rights are invaded, and that their extreme necessities have obliged them to emigrate to countries far less hospitable than their own.

† A Tree is defined to be a perennial plant, which rises to a very great height, with a simple, woody, and durable Stem, or Trunk. By these characters Trees are di-

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ceduous, fruticant and shrubby; feras and wild; or more civilized and domestic; and such as are sative and hortensial subalternate to the other; but of which I give only a touch, distributing the rest into these two classes, the dry and the aquatic; both of them applicable to the same civil uses of building, utensils, ornament, and fuel; for to dip into their

NOTES.

stinguished, with great accuracy, from Herbs, whose stems are frequently compound, herbaceous, or succulent, and die down to the root every year. It is evident from the characters just enumerated, that all trees are perennial. Herbs are either annual, that is of one year's duration; or biennial, of two; those only are perennial, whose roots, not perishing with the stems, continue a long time under the surface of the ground, and put forth a new stem every year.—Upon these obvious and striking differences was founded the very ancient division of vegetables into herbs and trees; though, perhaps, that distinction was principally suggested by the difference of size and duration of the plants in question. Be that as it may, the division has been esteemed so natural and spontaneous, that, from the time of Aristotle and Theophrastus to the present age, it has obtained a principal place in almost every system, except that of Linnæus, which mixes herbs, shrubs, and trees promiscuously together. But this is evidently to preserve the harmony of his system, which is solely founded on the fructification of every individual Genus and Species. We may therefore easily discover the reason of Linnæus's overlooking every other idea that did not fall in with his own, and of his affirming that, in this particular, Nature has put no limits between trees and shrubs.—Among the celebrated names in botany, which have retained the ancient distinction, are numbered Cæsalpinus, the father of systematic botany; Morison, Hermannus, Christopher Knaut, Boerhaave, Ray, Ponteder, and Tournefort. The latter, rather than omit a division, through custom become necessary, chose to hurt the elegance and uniformity of his plan; and, in fact, spun out into twenty-two classes, what, without such division, might have been easily comprised in seventeen.—On the opposite side are ranged Rivinus, Christian Knaut, Linnæus, Ludwig, and other names of less note. The distinction into Trees and Shrubs, though of equal antiquity, is neither so obvious, nor are its limits so accurately ascertained. In fact, of the numerous characteristic differences which have been suggested by botanical writers, not one is perfectly satisfactory. To say with Tournefort, that trees are universally taller than shrubs, is, in effect, saying nothing, unless a certain fixed, immutable standard were previously established. Besides, every thing respecting dimension is so variable in its nature, and depends so much upon difference of climate, soil, and management, that were a standard of this kind attempted to be established, the greatest confusion would ensue; and the same plant in different countries, and even in opposite soils in the same country, would receive different appellations, according as it exceeded, or came short of, the given standard.—Thus the *ricinus*, or palma christi; the dwarf rosebay, *rhododendron*; the strawberry-tree, *arbutus*; and several others, which grow to the size of very large trees in warm climates, are, in this country, equalled and even exceeded in

OF FOREST-TREES.

5

medicinal virtues is none of my province, though I sometimes glance at them with due submission, and in few instances*.

INTROD.

4. Among the Dry, I esteem the more principal and solid to be the Oak, Elm, Beech, Ash, Chestnut, Wallnut, &c. The less principal, the Service, Maple, Lime-tree, Horn-beam, Quick-beam, Birch, Hazel, &c. together with all their subalternate and several kinds.

Sed neque quàm multæ species, nec nomina quæ sint,
Est numerus; neque enim numero comprehendere refert:
Quem qui scire velit, Libyci velit æquoris idem
Discere, quam multæ Zephyro turbentur arenæ. VIRG. *Geor.* ii.

I pass the rest, whose ev'ry race and name,
And kinds, are less material to my theme:
Which who would learn, as soon may tell the Sands,
Driv'n by the western winds on Lybian Lands.

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height by many of our smallest shrubs.—The difference of soil and culture in the same climate, produces a like diversity in dimension. Thus, to take an example from herbaceous vegetables, the marigold, which, in a fat and moist earth, rises two feet high, scarce exceeds the same number of inches in a dry and gravelly soil.—The learned Dr. Alton, in his *Tyrocinium Botanicum*, wishes to consider the distinction into trees and shrubs, as a true natural distinction, and endeavours to trace its foundation in the internal structure of the plants themselves. All trees, says he, whether they bear buds or not, are covered with two barks, the outer and inner, called by the botanists *cortex* and *liber*. Shrubs differ from herbaceous vegetables in the duration of their stems; from trees in the nature of their covering, which is not a bark, but a cuticle or simple skin.—This thought is ingenious; but the fact on which it depends, is not sufficiently ascertained.—The farther distinction into shrubs and under-shrubs, which is exceedingly arbitrary and indeterminate, was first suggested by Clusius, in a work intitled, *Rariores & Exoticæ Plantæ*, published in 1576; and afterwards adopted by Cæsalpinus, and others.

* In this Mr. Evelyn imitates Virgil, who, in a few instances, gives the medicinal virtues of trees and shrubs.

Ipsa ingens arbor, faciemque simillima Lauro:
Et, si non alium late jactaret odorem,
Laurus erat: folia haud ullis labentia ventis:
Flos apprima tenax: animas & olentia Medi
Ora foveat illo, & senibus medicantur anhelis. GEORG. lib. ii. l. 131.

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5. Of the Aquatical, I reckon the Poplars, Asp, Alder, Willow, Sal-low, Osier, &c. Then I shall add a word or two for the encouragement of the planting of fruit-trees, together with some less vulgar, but no less useful trees, which, as yet, are not endenized amongst us, or, at least, not much taken notice of: and in pursuance hereof, I shall observe this order: First, to shew how they are to be raised, and then cultivated. By raising, I understand the seed and the soil; by culture, the planting, fencing, watering, dressing, pruning, and cutting; of all which briefly.

6. And first for their raising: Some there are,

Spring of themselves, unforc'd by human care. — nullis hominum cogentibus, ipsæ
Sponte sua veniunt—

Specified according to the various disposition of the air and soil;

Some from their seeds arise,

Pars autem posito surgunt de semine.

As the Oak, Chestnut, Ash, &c.

Some to thick groves from their own roots do spring, Pullulat ab radice aliis densissima sylva.

As the Elm, Alder, &c. And there are others

Grow without root,

Nil radicis egent—

As Willows, and all the vineous kinds, which are raised by sets only.

These ways first Nature gave.

Hos Natura modos primum dedit—

And that immortal Poet has so elegantly and comprehensibly described, as I cannot pass.

Principio arboribus varia est Natura creandis.

Namque aliæ, nullis hominum cogentibus, ipsæ

Sponte sua veniunt, camposque & flumina late

Curva tenent: ut molle siler, lentæque genistæ,

Populus & glaucâ canentia fronde salicæ.

Pars autem posito surgunt de semine: ut altæ

Castaneæ, nemorumque Jovi quæ maxima frondet

Æsculus, atque habitæ Graiis oracula quercus.

Pullulat ab radice aliis densissima sylva:

Ut cerasis, ulmisque: etiam Parnassia laurus

Parva sub ingenti matris se subjicit umbrâ.

Hos Natura modos primum dedit: his genus omne

Sylvarum fruticumque viret, nemorumque sacrorum.

Sunt alii, quos ipse viâ sibi repperit usus.

VIRG. Geor. ii.

OF FOREST-TREES.

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Some trees their birth to bounteous Nature owe :
 For some without the pains of planting grow.
 With Osiers thus the banks of brooks abound,
 Sprung from the wat'ry genius of the ground :
 From the same principles grey Willows come ;
 Herculean Poplar, and the tender Broom.
 But some from seeds inclos'd in earth arise :
 For thus the mast-ful Chestnut mates the skies.
 Hence rise the branching Beech, and vocal Oak,
 Where Jove of old oraculously spoke.
 Some from the root a rising wood disclose ;
 Thus Elms, and thus the salvage Cherry grows.
 Thus the green Bays, that binds the poet's brows,
 Shoots, and is shelter'd by the mother's boughs.
 These ways of planting Nature did ordain,
 For Trees and Shrubs, and all the Sylvan reign.
 Others there are, by late experience found : &c.

For thus we see there are more ways to the wood than one, and she has furnished us with variety of expedients.

7. And here we might fall into a deep philosophical research, whether the Earth itself in some place thereof or other, even without seed, branch, or root, &c. would produce every kind of vegetable, as it manifestly does divers sorts of grafs and plants? viz. the Trefoil, or Clover, in succulent land; in dry ground, May and Ragweeds; in the very moist, Ros-folis, Argentina, Flags, &c. and in the very barren, Fern, Broom and Heath, &c. So Virgil notes sterile places for the Pitch-tree; we our wet and uliginous for the Birch, Alder, &c. The more lofty, poor, and perflatile, for Yew, Juniper, Box, and the like. And we read in the natural histories of divers countries, that the Cedar, Palmetos, Queen-Pines, Ebony, Nutmeg, Cinnamon, &c. for Trees; the Tulip, Hyacinth, Crocus, &c. for Flowers; are sometimes, and in some regions, Aborigines, descended immediately from the genius of the soils, climate, sun, shade, air, winds, water, nitrous salts, rocks, banks, shores, and (like the Negroes-heads in the Barbadoes) as some imagine, even without seed, or at least any perceptible rudiment. Let it not then be imputed an impertinent digression, if, upon this occa-

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sion of spontaneous and æquivocal productions*, we mention how that inveterate dispute, which has exercised so many Naturalists and Philosophers (about Mistleto) has lately been decided by an evident experiment, and the testimony of the most curious and learned Botanists, by the seeds of that excrecence; which being inserted into an hole made in the bark of the White Poplar, produces the plant which has hitherto raised so many years controversy. (See Mr. Ray's *Hist. Plant.* p. 1583; and *Appendix*, p. 1918†.)

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* It is no wonder that some should suppose Vegetables capable of being produced without their parent seeds, when it was once held as a reasonable doctrine that Animals, such as Maggots, Flies, &c. might be generated by Putrefaction. We are taught by glasses that all Animals, however minute, are organized, and we have convincing proofs that they are also regulated by the same general laws that direct the œconomy of the larger Animals. Could Putrefaction give birth to an organized Animal, the order of nature, established at the beginning of the world, would by this time have been overturned, and scarce one species of Animals or Plants which were the objects of Solomon's attention, would at this day be visible upon the face of the earth. A Horse might as well spring from a dunghill as a Fly, and the brawny Oak might as readily be produced by a ferment in the earth, as the Trefoils and Ragweed described by Mr. Evelyn. Before putrefaction can produce the greater wonder, it must be able to produce the lesser; and who ever saw a repeating watch, or a musical clock, created by the ferment of a dunghill!

— nil femine egeret :

E mare primum homines, e terra posset oriri

Squammigerum genus, & volucres; erumpere cœlo

Armenta, atque aliæ pecudes: genus omne ferarum

Incerto partu culta, ac deserta teneret:

Nec fructus iidem arboribus consistere solerent,

Sed mutarentur: ferre omnes omnia possent. LUCRET. lib. i. l. 162.

This doctrine of spontaneous, or equivocal, generation was originally invented in Egypt, with a view to solve the phenomenon of the numerous swarms of flies and insects that were generated upon the surface of the mud left by the waters of the Nile.

† The Mistleto, instead of rooting and growing in the earth, like other plants, fixes itself and takes root on the branches of trees. It spreads out with many branches and forms a large bush. It is commonly found upon the White Thorn, the Apple, the Crab, the Ash, and Maple, but is rarely seen upon the Oak; which last kind, as Mr. Ray well observes, was chiefly esteemed in medicine, owing to the superstitious honours which the ancient Druids of this island paid to that plant when gathered there. This is a parasitical plant, and is always produced from seed. Some of the ancients called it an excrecence on the tree, growing without seed; which opinion is now fully confuted by a number of experiments. It is the opinion of some, that it is pro-

But, after all this, there are who suppose some previous seminal disposition to be lurking, and dispersed in every part of the earth (in what molecule, or subtle contexture, they cannot discover) which though haply not at first so perfect as the maturer seeds of their after peculiar plants; yet such as are fit for the sun and influences to operate on, till they have prepared, discussed, and excited the seminal and prolific virtue to exert itself and awake out of sleep, in which they lie as in their causes, freeing themselves from those impediments which hindered their specification and nativity. This conception the learned Gassendus would illustrate by the latent fire in flints, which never betrays itself till it be forced out by collision: but which yet, methinks, does not so fully enlighten this hypothesis, which we only mention: for the design of this discourse is not to persuade men to sit still, and let nature work alone, but to aid and assist her as much as

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propagated by the Mistle Thrush, which, feeding upon the berries, leaves the seeds with its dung upon the branches of the respective trees where the plant is commonly found. Others say, that as the berries are extremely glutinous, the seeds frequently stick to the beaks of those birds, which being rubbed off upon the branches of trees, they become inoculated, as it were, and take root. In the same manner the Mistleto may be propagated by art; for if the berries, when full ripe, be rubbed upon the smooth part of the bark of almost any tree, they will adhere closely, and produce plants the following winter. In the garden lately belonging to Mr. James Collins of Knaresbrough, are many large plants of the Mistleto, produced in this manner upon the Dwarf Apple-tree. Of Mistleto we have only one species growing in Europe, viz. *Viscum (album) foliis lanceolatis obtusis, caule dichotomo, spicis axillaribus*, Lin. Sp. Plant. 1023. *Mistleto with blunt spear-shaped leaves, forked stalks, and spikes of flowers rising from the wings of the stalks.* *Viscum baccis albis*, C. B. P. 423. *Mistleto with white berries.*

The gathering of the Mistleto made a part of the religious worship of the Druids. When the end of the year approached, they marched with great solemnity to gather it in order to present it to Jupiter, inviting all the world to assist at the ceremony in these words: "The new year is at hand, gather the Mistleto." The sacrifices being ready, the Priest ascended the Oak, and with a golden hook cut off the Mistleto, which was received in a white garment spread for that purpose. This part of the ceremony being ended, the victims, two white bulls that never had been yoked, were brought forth and offered up to the Deity, with prayers that he would prosper those to whom he had given so precious a boon. Of the Mistleto, thus gathered, they made a potion which they administered as an antidote to all poisons, and used as a remedy to prevent sterility. Besides the Mistleto, the Druids ritually gathered the Selago, or *Fir Club-moss*, and the Samolus, or *Round-leaved Water Pimpernell*, both which they applied to medicinal purposes. It may here be remarked that the Druids, in several of their religious cere-

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they are able, from seeds and plants already perfected, and qualified for more speedy propagation. It not being in any sort my meaning throughout this discourse, as if (where I speak of spontaneous productions) I believed that any vegetables raised themselves without some predisposed qualified seed or principle. But by spontaneous, I understand such trees and plants as were not sown or cultivated by human industry, as most of our forest-trees never were, and yet had their original from perfect seeds. And if I think the same of all animals, even to the minutest worm and insect, there are so many learned persons and experiments to justify it, that I need say no more. Most ingenious, in the mean time, is what some, upon an accurate and narrow guess, have not feared to pronounce; namely,

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monies, had a delicacy superior to most of the Ancients; for in gathering the Mistletoe they always used a golden hook; whereas among other nations, a hook of brass was thought good enough for the like purposes.

Falcibus & messæ ad Lunam quærantur ahenis.

Pubentes herbæ, ———— *ÆN.* lib. iv.

Partim succedit curvamine falsis ænæ. *OID. MET.* lib. viii.

In Sophocles, Medea is described as gathering her magic herbs with a brazen hook, and afterwards putting their juice into brazen pots.—Virgil, with great poetical elegance, compares the golden bough to the Mistletoe, on account of its being an adventitious plant, and of a golden colour.

Quale solet Sylvis brumali frigore viscum

Fronde virere nova, quod non sua seminat arbos,

Et croceo foetu teretes circumdare truncos.

Talis erat species auri frondentis opacâ

Ilice, sic leni crepitabat bractea vento. *ÆN.* lib. vi. l. 205.

The story of the golden bough shews that the Druids were not singular in attributing great magical powers to scarce and beautiful plants, ritually gathered, and offered to the Gods.

Hoc sibi pulchra suum ferri Proserpina munus

Instituit. ———— *Ib.* l. 142.

Ergo alie vestiga oculis, & rite repertum

Carpe manu; ———— *Ib.* l. 145.

And here it may not be improper to remark, that ancient customs are a considerable time before they can be effaced, even in countries that have experienced the calamities of conquest; for in France, as Keyser informs us, something of the Druidical ceremonies, relative to the Mistletoe, subsists in the province of Aquitain. “In Aquitania quotannis Prid. Kal. Jan. pueri atque adolescentes vicos villasque obeunt, carmine “*stipem petentes, sibique, atque aliis pro voto, in exordio novi anni acclamantes,* “ALLGUY, L’AN NEUF.”

that all planting by seed was but a kind of inoculation; and propagation by cyons and sprouts, but a subterranean grafting. And upon this account I am the more willing to assent, that, in removing of wild trees taken out of incumbered places, (so it be performed with all due circumstances) there may happen considerable improvements; since, as there is something in super-grafting, or the repetition of grafting, for the enlargement and melioration of fruit, so there may be also in a careful removal; especially the tree being of a kind apt to dilate its roots, and taken whilst those roots may be safely and intirely transferred; and likewise, because it is presumed that most trees, propagated by seeds, emit a principal root very deep into the earth, which frequently extracting but a coarser nutriment (though it may haply yield a close and firmer timber) is not yet so apt to shoot and spread, as what are by removal deprived of that root; and by being more impregnate with the sun, dews, and heavenly influences near the surface, enabled to produce larger, more delicate, and better tasted fruit; supposing nuts, mast, or berries; for we would not go out of our forest for instances: and yet even in these descents of the tap root, it sometimes penetrating to a vein of some rich marl or other mould, the extraordinary flourishing and expedition of growth will soon give notice of it. But to make some trial of this, it were no difficult matter, when one plants a nursery or grove, to experiment what the earth, as far as the roots are like to reach, will advance and discover to us.

8. In the mean time, it has been stiffly controverted by some, whether were better to raise trees for timber and the like uses, from their seeds and first rudiments; or to transplant such as we find have either raised themselves from their seeds, or sprung from the mother-roots. Now that to produce them immediately of the seed is the better way, these reasons may seem to evince.

First, Because they take soonest. *Secondly*, Because they make the straitest and most uniform shoot. *Thirdly*, Because they will neither require staking nor watering, which are two very considerable articles. And, *lastly*, For that all transplanting, (though it much improves fruit-trees) unless they are taken up the first year or two, is a considerable impediment to the growth of forest-trees: And though it be true, that divers of those which are found in woods, especially Oaklings, young Beeches, Ash, and some others, spring from the self-sown Mast and Keys;

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yet being for the most part dropped, and disseminated among the half-rotten sticks, musty leaves, and perplexities of the mother-roots, they grow scraggy, and, being over-dripped, become squalid and apt to gather mofs,

Crescentique adimunt foetus, uruntque ferentem. Geor. lib. ii.

Which checks their growth, and makes their bodies pine.

Nor can their roots expand, and spread themselves as they would do, if they were sown, or had been planted in a more open, free, and ingenuous soil. And that this is so, I do affirm upon experience, that an Acorn, sown by hand in a Nursery, or ground where it may be free from these incumbrances, shall in two or three years out-strip a plant of twice that age, which has either been self-sown in the woods, or removed, unless it fortune, by some favourable accident, to have been scattered into a more natural, penetrable, and better qualified place; but this disproportion is yet infinitely more remarkable in the Pine and the Walnut-tree, where the Nut, set into the ground, does usually overtake a tree of ten years growth which was planted at the same instant, and this is a secret so generally misrepresented by most of those who have treated of these sorts of trees, that I could not suffer it to pass over without a particular remark; so as the noble Poet (with pardon for receding from so venerable authority) might be mistaken, when he delivers this observation as universal, to the prejudice of sowing, and raising woods from their rudiments:

*Jam, quæ feminibus jactis se sustulit arbos,
Tarda venit, feris factura nepotibus umbram. Geor. lib. iii.*

Trees, which from scatter'd seeds to spring are made,
Come slowly on, for our grand-children's shade.

And, indeed, I know divers are of this opinion; and possibly in some luckier soils, and where extraordinary care is had in transplanting and removing cumbrances, &c. there may be reason for it: But I affirm it *ὡς ἐπὶ πολὺ*, and for the most part, and find I have the suffrage of another no inelegant Poet, if not in a full assent to my assertion, yet in the choice of my procedure for their perfection.

——— Quamvis ipsa de stirpe parentis
 Pullulet, & tenues tollat se quercus in auras,
 Aut mutata solo, ramis exsultat opacis;
 Forma tamen nemoris non sit mihi gratior ulla,
 Quam quod per campos, posito de femine, crevit.
 Et quamquam sit agro prælongum tempus inertī
 Ducendum, ac tardæ surgant de femine quercus,
 His tamen, his longe veniunt felicius umbræ.
 Nam certum est de glande fatas radicibus imis
 Altius in terram per se descendere plantas:
 Majoresque adeo in cælum profundere ramos.
 Seu quod dediscant mutatam semina matrem,
 Degeneremque ferant alieno ex ubere prolem:
 Sive quod ipsa sibi cognatæ inolescere terræ
 Glans primo melius paulatim assuevit ab ortu.

RAPINUS *Hort.* lib. ii.

——— Though suckers which the stock repair,
 Will with thick branches crowd the empty air;
 Or the Ground-Oak transplanted, boughs may shoot;
 Yet no such grove does with my fancy suit,
 As what from Acorns set on even rows,
 In open fields at their due distance grows.
 What though your ground long time must fallow lie,
 And Seedling-Oaks yield but a slow supply?
 No walks else can be for like beauty prais'd:
 For certain 'tis that Plants from Acorns rais'd,
 As to the centre deeper fibres spread,
 So to the Zenith more advance their head:
 Be it that Plants for natural moisture pine,
 And as expos'd, at change of soil decline;
 Or that the Acorn with its native mould,
 Does thrive and spread, and firm alliance hold.

DENDROLOGIA.

BOOK THE FIRST.

CHAP. I.

Of the Earth, Soil, Seed, Air, and Water.

BOOK I.
EARTH.

1. **I**T is not my intention here to speak of Earth, as one of the common reputed Elements, of which I have long since published an ample account in an exprefs treatise *, which I defire my reader to perufe, fince it might well commute for the total omiffion of this chapter, did not method feem to require fomething briefly to be faid; which firft, as to that of Earth, we fhall need at prefent to penetrate no deeper into her bofom, than, after paring off the turf, fcarrying the upper mould, and digging convenient pits and trenches, not far from the natural furface, without difturbng the feveral frata and remoter layers, whether of clay, chalk, gravel, fand, or other fucceffive layers, and concretis foffil (though all of them ufeul fometimes, and agreeable to our forefters) though few of them what one would choofe before the under turf, black, brown, gray, and light, and breaking into fhort clods, and without any difagreeable fcent, and with fome mixture of marl or loam, but not clammy; of which I have particularly fpoken in that treatife.

SOIL.

2. In the mean time, this of the Soil (which I think is a more proper term for compofits) or mould rather, being of greater importance for the raifing, planting, and propagation of trees in general, muft at no hand be neglected; and is therefore, on all occafions, mentioned in almoft every chapter of our enfuing difcourfe. I fhall therefore not need to affign it any part, when I have affirmed in general, that moft timber-trees grow

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* This treatife is intitled TERRA, or a PHILOSOPHICAL account of EARTH, and was published at the requelt of the Royal Society in the year 1679. It accompanieth all the editions of the SILVA from that date.

and prosper well in any tolerable land which will produce corn or rye, and which is not in excess stony, in which nevertheless there are some trees delight, or altogether clay, which few or none do naturally effect; and yet the Oak is seen to prosper in it, for its toughness preferred before any other by many workmen; tho' of all Soils the cow-pasture doth certainly exceed, be it for what purpose soever of planting wood. Rather therefore we should take notice how many great wits † and ingenious persons, who have leisure and faculty, are in pain for improvements of their heaths and barren hills, cold and starving places, which causes them to be neglected and despaired of; whilst they flatter their hopes and vain expectations with fructifying liquors *, chymical menstruums, and such vast

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† At the time when Mr. Evelyn wrote, and long before, wit and wisdom were considered as synonymous terms.

— then might I by council help my truth, which by mine own witt I am not able agaynste such a prepared thyng. *Sir THOMAS WYAT's Defence.*

* The steeping of seeds in prolific liquors is not of modern invention. The Romans, who were good husbandmen, have left us several receipts for steeping of grain, in order to increase the powers of vegetation. In England, France, Italy, and in all countries where agriculture has been attended to, we see a variety of liquors recommended for the same purpose.—Good nourishment has ever been observed to add strength and vigour to all vegetables. Hence it was natural to suppose that, by filling the vessels of the grain with nourishing liquors, the germ, with its roots, would be invigorated. How far this reasoning is founded upon just principles, remains to be examined. For my part, I am not an advocate for steeping. All my experiments demonstrate that they have no inherent virtue. I have more than once sown the same seed, steeped and unsteeped, and though all other circumstances were minutely alike, yet I never could observe the least difference in the growth of the crop. I confess that when the light seeds are skimmed off, as in the operation of brining, the crop will be improved, and diseases prevented: but these advantages proceed from the goodness of the grain sown, and not from any prolific virtue of the steep. I am happy in not being singular in my objection to steeping. Many rational farmers have been induced to quit their prejudices, and are now convinced from their own trials, that there is no dependence upon prolific liquors, though ever so well recommended. Some people have been hardy enough to persuade themselves, that the tillering of wheat may be so much increased by invigorating the grain, that only one half of the seed will be required.—Duhamel, one of the most accurate of the experimental husbandmen, and a most excellent philosopher, speaks, in the strongest terms, against the practice of steeping, so far as it supposes an impregnation of vegetative particles. I shall not here repeat his experiments. I shall only observe, that they are such as any farmer

BOOK I. conceptions; in the mean time that one may shew them as heathy and hopeleſs grounds, and barren hills as any in England, that do now bear, or lately have borne woods, groves, and copſes, which yield the owners more wealth than the richeſt and moſt opulent wheat-lands: And if it be objected, that it is ſo long a day before theſe Plantations can afford that gain; the Brabant Nurseries, and divers Home-plantations of induſtrious perſons, are ſufficient to convince the gain-ſayer. And when, by this huſbandry, a few Acorns ſhall have ſupplied the neighbouring regions with young ſtocks and trees, the reſidue will become groves, and copſes of infinite delight and ſatisfaction to the Planters. Beſides, we daily ſee what coarſe lands will bear theſe ſtocks (ſuppoſe them Oaks, Walnuts, Cheſnuts, Pines, Fir, Aſh, Wild Pears, Crabs, &c.) and ſome of them (as for inſtance, the Pear and the Fir, or Pine) ſtrike their roots through the

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may make; they are plain and concluſive.—Good ſeed, when ſown upon land in excellent tilth, will always produce a plentiful crop. The beſt of grain impregnated to the full with the moſt approved ſteep, and ſown upon land indifferently prepared, will for ever balk the hopes of the farmer. I do not preſume to condemn the practice in poſitive terms, becauſe my experiments are againſt it. Other experiments may be oppoſed to mine. I ſhall therefore reſt the whole upon a deſcription of what happens to grain after it has been committed to the earth, and hope that I ſhall be able to explain myſelf with ſufficient perſpicuity. The ſubject is curious, and the diſcuſſion of it not very difficult.

A grain of wheat contains, within two capſules, a conſiderable ſhare of flour, which, when melted down into a liquor by the watery juices of the earth, conſtitutes the nourishment of the tender plant, until its roots are grown ſufficiently large to abſorb their own food. Here is evidently a ſtore-houſe of nutriment. And from that idea it is plain that the plumpſt grains are the moſt eligible for ſeed. Some imagine that poor grains may be ſo impregnated, as to make them equal in vegetative force to the largeſt. I have more than once made the experiment, and am convinced that plump ſeeds, of the ſame heap, are ſuperior in goodneſs to the ſmall ones, though ever ſo carefully macerated. The farina being the food of the embryo plant, it follows that the vegetative powers will be increaſed in proportion to its quantity.—I have ſprouted all kinds of grain in a variety of ſteeps, and can aſſure the farmer, that the radicle and germ never appeared ſo vigorous and healthy, as when ſprouted by elementary water: an argument that the ſeed requires no aſſiſtance. The ſame ſteep, when applied in quantities to the ſoil, will undoubtedly invigorate the roots, and nourish the plant; but in that caſe it operates in common with other manures, and loſes the idea of a ſteep. As nitre, ſea-ſalt, and lime, are generally added to the ſteeps, I have conſtantly obſerved that their application rendered the radicle and germ yellow and ſickly: a plain proof that they were unnaturally uſed at that ſeaſon. Did the farina

roughest and most impenetrable rocks and clefts of stone itself; and others require not any rich or pinguid, but very moderate Soil; especially, if committed to it in seeds, which allies them to their mother and nurse without renitency or regret: And then considering what assistances a little care in easing and stirring of the ground about them, for a few years, does afford them; what cannot a strong plow, a winter mellowing, and summer heats, incorporated with the pregnant turf, or a slight assistance of lime, loam, sand, rotten compost, discreetly mixed (as the case may require) perform even in the most unnatural and obstinate soil? And in such places where antiently woods have grown, but are now unkind to them, the fault is to be reformed by this care; and chiefly by a sedulous extirpation of the old remainders of roots, and latent stumps, which, by their mustiness, and other pernicious qualities, sour the ground, and poison the conception: And herewith let me put in this note, that even an over-rich and pinguid composition is by no means the proper bed either for Seminary or Nursery, whilst even the natural Soil itself does frequently discover and point best to the particular species, though some are for all places alike; nor should the Earth be yet perpetually cropped with the same, or other seeds, without due repose, but lie some time fallow to

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need any additional particles, it might be supposed that broth made of the flesh of animals would be the most agreeable. To be satisfied of that, I sprouted some grains in beef broth, and an equal number in simple water. The result was, that the radicle and germ produced by the broth were weaker, and less healthy, than the others sprouted by the pure element. They were afterwards sown, but I could perceive no apparent difference in the crop. As no invigorating or fructifying liquor, however pompously introduced, has ever stood the test of fair and correct experiment, we may venture to lay it down as an established truth, that *plump seed clear of weeds, and land well prepared to receive it, will seldom disappoint the expectations of the farmer*; and upon these he should rely for the goodness of his crop.—In this short dissertation upon steepes, or fructifying liquors, it should be remarked, that I have drawn my conclusions from experiments made upon grain, instead of the seeds of forest-trees, in full confidence that the general laws of vegetation are the same in every kind of seed, from the almost imperceptible seed of the Orchis to the Acorn of the Sovereign Oak: And I had this additional reason, that, in the course of a few months, I could make my observations upon the different stages of vegetation, from the first appearance of the germ to the final perfection of the plant.

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receive the influence of heaven*, according to good husbandry. But I shall say no more of these particulars at this time, because the rest are sprinkled over this whole work in their due places; wherefore we hasten to the following title, namely, the choice and ordering of the feeds.

3. Choose your seed of that which is perfectly mature, ponderous, and sound; commonly that which is easily shaken from the boughs, or gathered about November, immediately upon its spontaneous fall, or taken from the tops and summities of the fairest and soundest trees, is best, and does,

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* The ingenious Dr. Priestley, in a paper presented to the Royal Society in 1773, on different kinds of air, among many other interesting and important discoveries, proves to a demonstration that the putrid air arising from dunghills and the perspiration of animals is not only absorbed by vegetables, but also adds to their increase. As I presume that this discovery was made prior to the Doctor's publication, I shall beg leave to produce my claim to it; at the same time acknowledging myself no ways intitled to share with him the honour of his experimental proofs.—In January 1769, being engaged in an investigation of the nature of the Food of vegetables, with a view to establish a theory of Agriculture, I discovered that there must be some secret property in the air, which restored worn-out lands to their former fertility; and as I could not persuade myself that it arose from the universal acid, so much talked of, I was led, by a chain of reasoning and some few experiments, to conclude that it must proceed from putrid exhalations, first generated upon the surface of the earth, then raised into the atmosphere, and afterwards brought down by rain: In this manner I supposed that the INFLUENCE OF HEAVEN, as Mr. Evelyn well expresses it, was obtained.—Having fully satisfied myself that worn-out lands were thus restored, I went a step further, and concluded, as I thought, with certainty, that all plants, by their leaves as well as by their roots, imbibed these putrid vapours for their food. And here I beg leave to remark, that I do not mean to say that plants have no other nutriment, as it may be proved to a demonstration that many things give them food without having undergone the putrid ferment.—March 8, 1769, I read a memoir upon this curious subject before the York Agriculture Society, being the day of their institution; and in June following I published it in a small Duodecimo Volume of 66 pages, under the title of *GEORGICAL ESSAYS*. The favourable reception that this work met with induced me to republish it in 1770, with considerable additions. The words I refer to are these: “During the summer months the atmosphere is full of putrid exhalations arising from the steam of dunghills, the perspiration of animals and smook. Every shower brings down these oleaginous* particles for the nourishment of plants.” *Georg. Essays, vol. I. p. 27.*

* The word *Oleaginous* is chiefly applied to smook, and corresponds with the theory of the food of plants, as described in the essays here quoted.

In a subsequent volume the thought is still stronger: “It is pleasing to observe how the dissolution of one body is necessary for the life and increase of another. All nature is in motion. In consequence of the putrid fermentation that is every where carried on, a quantity of vegetable nutriment ascends into the atmosphere. Summer

for the most part, direct to the proper season of interring, &c. according to institution. CHAP. I.

At specimen sationis, & insitionis origo

Ipsa fuit rerum primum natura creatrix :

Arboribus quoniam baccæ, glandesque caducæ

Tempestiva dabant pullorum examina subter. LUCRET. l. v.

Nature herself, who all created first,

Invented sowing, and the wild plants nurs'd :

When mast and berries from the trees did drop,

Succeeded under by a numerous crop.

Yet this is to be considered, that if the place you sow in be too cold for an autumnal semination, your Acorns, Mast, and other Seeds may be

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“ showers return much of it again ; but part falls into the sea and is lost : To this we
“ may add the animal and vegetable substances consumed on board of ships, all of
“ which are buried in the ocean. The industry of man restores them to the earth ; and
“ we may presume that the fish taken from the sea leave a balance in favour of man-
“ kind : Thus providence, with the most consummate wisdom, keeps up the necessary
“ rotation of things.” *Georg. Essays, vol. II. p. 135.*

So far I had considered this putrid nutriment as absorbed by the roots of plants ; but the ingenious experiments of Dr. Priestley refer to the absorption of the putrid air by the leaves of plants. That I had also remarked in a variety of places.—“ Hitherto I
“ have considered plants as nourished by their roots ; I shall now take a view of them
“ as nourished by their leaves. An attention to this part of the vegetable system is
“ essentially necessary to the rational farmer. Vegetables that have a succulent leaf,
“ such as vetches, peas, beans, and buck-wheat, draw a great part of their nourishment
“ from the air, and on that account impoverish the soil less than wheat, oats, barley,
“ or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing
“ plants, and consequently impoverishers of the soil ; but the former less so than the
“ latter, owing to the greater succulency of its leaf. The leaves of all kinds of grain
“ are succulent for a time, during which period the plants take little from the earth ;
“ but as soon as the ear begins to be formed, they lose their softness and diminish in
“ their attractive power. The radical fibres are then more vigorously employed in
“ extracting the oily particles of the earth for the nourishment of the seed. Such, I ap-
“ prehend, is the course of nature.” *Ibid. vol. I. p. 57.*

“ In order that we may have a distinct view of the motion of the sap, it will be neces-
“ sary to reflect, that the root, stem, branches, and leaves are constructed in the same

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prepared for the vernal, by being barrell'd or potted up in moist sand; or earth, stratum super stratum, during the winter; at the expiration whereof you will find them sprouted; and being committed to the earth, with a tender hand, as apt to take as if they had been sown with the most early, nay, with great advantage: By this means too, they have escaped the vermin, which are prodigious devourers of winter sowing, and will not

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"manner. Sallows, willows, vines, and most shrubs, will grow in an inverted state, with their tops downward in the earth. Dr. Bradley describes the manner of inverting a young cherry-tree, the roots of which will put forth leaves, and the branches become roots. Hence it is obvious that the nutritive matter may be conveyed as well by the leaves as the roots, their vascular structure being the very same."

Georg. Effcys, vol. I. p. 168.

"During the heat of a summer's day, all plants perspire freely from the pores of their leaves and bark. At that time the juices are highly rarefied. The diameters of the Tracheæ, or air-vessels, are enlarged, so as to press upon and straiten the vessels that carry the sap. In consequence of which their juices, not being able to escape by the roots, are pressed upward, where there is the least resistance, and perspire off the excrementitious parts by the leaves and top-branches, in the form of vapour. When the solar heat declines, the Tracheæ are contracted. The sap-vessels are enlarged, and the sap sinks down in the manner of the spirits of a thermometer. In consequence of this change, the capillary vessels of the leaves and top-branches become empty: Being surrounded with the humid vapours of the evening, they fill themselves from the known laws of attraction, and send down the new-acquired juices to be mixed with those that are more elaborated. As soon as the sun has altered the temperature of the air, the Tracheæ become again distended, and the sap-vessels are straitened. The same cause always produces the same effect; and this alternate ascent and descent, through the same system of vessels, continues as long as the plant survives." *Ibid. vol. I. p. 170.*

"Air is to be found in every portion of earth; and as it always contains a solution of the volatile parts of animal and vegetable substances, we should be careful to keep our stiff soils as open as possible to its influence. It passes, both in its active and fixed state, into the absorbent vessels of the root, and, mixing with the juices of the plant, circulates through every part. Dr. Hales, in his statical experiments upon the vine, discovered it ascending with the sap in the bleeding season." *Ibid. vol. I. p. 180.*

These extracts, published in 1769 and 1770, will, I flatter myself, secure to me the priority of the discovery relative to the putrid and noxious particles of the air being consumed by the vegetable creation. The whole of Dr. Priestley's experiments are so ingeniously conducted, and his conclusions so fairly drawn, that I cannot leave this subject without extracting from them so much as regards the present enquiry. "When air has been freshly and strongly tainted with putrefaction, so as to smell

be much concerned with the increasing heat of the season, as such as being crude; and unfermented, are newly sown in the beginning of the spring, especially in hot and loose grounds; being already in so fair a progress by this artificial preparation, and which (if the provision to be made be very great) may be thus managed: Choose a fit piece of ground, and with boards (if it have not that position of itself) design it three feet high; lay

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“ through the water, sprigs of mint have presently died, upon being put into it, their
 “ leaves turning black; but if they do not die presently, they thrive in a most surprizing
 “ manner. In no other circumstances have I ever seen vegetation so vigorous as in this
 “ kind of air, which is immediately fatal to animal life. Though these plants have
 “ been crouded in jars filled with this air, every leaf has been full of life; fresh shoots
 “ have branched out in various directions, and have grown much faster than other simi-
 “ lar plants, growing in the same exposure in common air.—This observation led me to
 “ conclude, that plants, instead of affecting the air in the same manner with animal re-
 “ spiration, reverse the effects of breathing, and tend to keep the atmosphere sweet and
 “ wholesome, when it is become noxious, in consequence of animals either living and
 “ breathing, or dying and putrefying in it.—In order to ascertain this, I took a quantity
 “ of air, made thoroughly noxious, by mice breathing and dying in it, and divided it
 “ into two parts; one of which I put into a phial immersed in water; and to the other
 “ (which was contained in a glass jar, standing in water) I put a sprig of mint. This
 “ was about the beginning of August 1771, and after eight or nine days, I found that
 “ a mouse lived perfectly well in that part of the air, in which the sprig of mint had
 “ grown, but died the moment it was put into the other part of the same original quan-
 “ tity of air; and which I had kept in the very same exposure, but without any plant
 “ growing in it.—This experiment I have several times repeated; sometimes using air
 “ in which animals had breathed and died; sometimes using air tainted with vegetable
 “ or animal putrefaction, and generally with the same success.—Once I let a mouse live
 “ and die in a quantity of air which had been noxious, but which had been restored by
 “ this process, and it lived nearly as long as I conjectured it might have done in an equal
 “ quantity of fresh air; but this is so exceedingly various, that it is not easy to form
 “ any judgment from it; and in this case the symptom of *difficult respiration* seemed to
 “ begin earlier than it would have done in common air.—Since the plants that I made
 “ use of manifestly grow and thrive in putrid air; since putrid matter is well known to
 “ afford proper nourishment for the roots of plants; and since it is likewise certain that
 “ they receive nourishment by their leaves as well as by their roots, it seems to be ex-
 “ ceedingly probable, that the putrid effluvia is in some measure extracted from the air,
 “ by means of the leaves of plants; and therefore that they render the remainder more
 “ fit for respiration.—Towards the end of the year some experiments of this kind did
 “ not answer so well as they had done before, and I had instances of the relapsing of this
 “ restored air to its former noxious state: I therefore suspended my judgment concerning

Book I. the first foot in fine earth, another of Seeds, Acorns, Mast, Keys, Nuts, Haws, Holly-berries, &c. promiscuously or separate, with, now and then, a little mould sprinkled amongst them; the third foot wholly earth: Of these preparatory magazines make as many and as much larger ones as will serve your turn, continuing it from time to time as your store is brought in. The same for ruder handlings, may you also do by burying your

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“ the efficacy of plants to restore this kind of noxious air, till I should have an opportunity of repeating my experiments, and giving more attention to them. Accordingly I resumed the experiments in the summer of the year 1772, when I presently had the most indisputable proof of the restoration of putrid air by vegetation; and as the fact is of some importance, and the subsequent variation in the state of this kind of air is a little remarkable, I think it necessary to relate some of the facts pretty circumstantially. The air, on which I made the first experiments, was rendered exceedingly noxious by mice dying in it on the 20th of June. Into a jar nearly filled with one part of this air, I put a sprig of mint, while I kept another part of it in a phial, in the same exposure; and on the 27th of the same month, and not before, I made a trial of them, by introducing a mouse into a glass vessel, containing $2\frac{1}{4}$ ounce measures filled with each kind of air; and I noted the following facts. When the vessel was filled with the air in which the mint had grown, a very large mouse lived five minutes in it, before it began to shew any sign of uneasiness. I then took it out, and found it to be as strong and vigorous as when it was first put in; whereas in that air which had been kept in the phial only, without a plant growing in it, a younger mouse continued not longer than two or three seconds, and was taken out quite dead. It never breathed after, and was immediately motionless. After half an hour, in which time the larger mouse (which I had kept alive, that the experiment might be made on both the kinds of air with the very same animal) would have been sufficiently recruited, supposing it to have received any injury by the former experiment, was put into the same vessel of air; but though it was withdrawn again, after being in it hardly one second, it was recovered with difficulty, not being able to stir from the place for near a minute. After two days, I put the same mouse into an equal quantity of common air, and observed that it continued seven minutes without any sign of uneasiness; and being very uneasy after three minutes longer, I took it out. Upon the whole, I concluded that the restored air wanted about one fourth of being as wholesome as common air. The same thing also appeared when I applied the test of nitrous air.—In the seven days, in which the mint was growing in this jar of noxious air, three old shoots had extended themselves about three inches, and several new ones had made their appearance in the same time. Dr. Franklin and Sir John Pringle happened to be with me, when the plant had been three or four days in this state, and took notice of its vigorous vegetation, and remarkably healthy appearance in that confinement.—On the 30th of the same month, a mouse lived fourteen minutes, breathing naturally all the time, and without appearing to be much uneasy, till the last two minutes, in the

seeds in dry sand, or pulverized earth, barrelling them, as I said, in tubs, or laid in heaps in some deep cellar, where the rigour of the winter may least prejudice them; and I have filled old hampers, bee-hives and boxes with them, and found the like advantage, which is to have them ready for your Seminary, as before hath been shewed, and exceedingly prevent the Season. There be also who affirm, that the careful cracking and opening

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“ vessel containing two ounce measures and a half of air which had been rendered
 “ noxious by mice breathing in it almost a year before, and which I had found to be
 “ most highly noxious on the 19th of this month, a plant having grown in it, but not
 “ exceedingly well, these eleven days; on which account I had deferred making the
 “ trial so long. The restored air was affected by a mixture of nitrous air, almost as
 “ much as common air.—As this putrid air was thus easily restored to a considerable
 “ degree of fitness for respiration, by plants growing in it, I was in hopes that by the
 “ same means it might in time be so much more perfectly restored, that a candle
 “ would burn in it; and for this purpose I kept plants growing in the jars which con-
 “ tained this air till the middle of August following, but did not take sufficient care
 “ to pull out all the old and rotten leaves. The plants, however, had grown, and
 “ looked so well upon the whole, that I had no doubt but that the air must constantly
 “ have been in a mending state; when I was exceedingly surprized to find, on the
 “ 24th of that month, that though the air in one of the jars had not grown worse, it
 “ was no better, and that the air in the other jar was so much worse than it had been,
 “ that a mouse would have died in it in a few seconds. It also made no effervescence
 “ with nitrous air, as it had done before.—Suspecting that the same plant might be
 “ capable of restoring putrid air to a certain degree only, or that plants might have a
 “ contrary tendency in some stages of their growth, I withdrew the old plant, and put
 “ a fresh one in its place; and found that, after seven days, the air was restored to its
 “ former wholesome state. This fact I consider as a very remarkable one, and well de-
 “ serving of a farther investigation, as it may throw more light upon the principles of
 “ vegetation. It is not, however, a single fact; for I had several instances of the
 “ same kind in the preceding year; but it seemed so very extraordinary, that air should
 “ grow worse by the continuance of the same treatment by which it had grown better,
 “ that, whenever I observed it, I concluded that I had not taken sufficient care to
 “ satisfy myself of its previous restoration.—That plants are capable of perfectly
 “ restoring air injured by respiration, may, I think, be inferred with certainty from
 “ the perfect restoration, by this means, of air which had passed through my lungs,
 “ so that a candle would burn in it again, though it had extinguished flame before,
 “ and a part of the same original quantity of air still continued to do so. Of this one
 “ instance occurred in the year 1771, a sprig of mint having grown in a jar of this
 “ kind of air, from the 25th of July to the 17th of August following; and another
 “ trial I made, with the same success, the 7th of July 1772, the plant having grown
 “ in it from the 29th of June preceding. In this case also I found that the effect

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of stones, which include the kernels, as soon as ripe, precipitate growth, and gain a year's advance; but this is erroneous. Now, if you gather them in moist weather, lay them a drying, and so keep them till you sow, which may be as soon as you please after Christmas. If they spire out before you sow them, be sure to commit them to the earth before the sprout grows dry, or else expect little from them: And whenever you sow, if you prevent not the little field-mouse, he will be sure to have the better share*.

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“was not owing to any virtue in the leaves of mint; for I kept them constantly
 “changed in a quantity of this kind of air, for a considerable time, without making
 “any sensible alteration in it.—These proofs of a partial restoration of air by plants
 “in a state of vegetation, though in a confined and unnatural situation, cannot but
 “render it highly probable, that the injury which is continually done to the atmo-
 “sphere by the respiration of such a number of animals, and the putrefaction of such
 “masses of both vegetable and animal matter, is, in part at least, repaired by the
 “vegetable creation. And, notwithstanding the prodigious mass of air that is cor-
 “rupted daily by the above-mentioned causes; yet, if we consider the immense
 “profusion of vegetables upon the face of the earth, growing in places suited to their
 “nature, and consequently at full liberty to exert all their powers, both inhaling and
 “exhaling, it can hardly be thought, but that it may be a sufficient counterbalance to
 “it, and that the remedy is adequate to the evil.—Dr. Franklin, who, as I have
 “already observed, saw some of my plants in a very flourishing state, in highly noxious
 “air, was pleased to express very great satisfaction with the result of the experiments.
 “In his answer to the letter in which I informed him of it, he says, “*That the vege-
 table creation should restore the air which is spoiled by the animal part of it, looks like a
 rational system, and seems to be of a piece with the rest. Thus fire purifies water all the
 world over. It purifies it by distillation, when it raises it in vapours, and lets it fall in
 rain; and farther still by filtration, when, keeping fluid, it suffers that rain to percolate
 the earth. We knew before, that putrid animal substances were converted into sweet vege-
 tables, when mixed with the earth, and applied as manure; and now, it seems, that the
 same putrid substances, mixed with the air, have a similar effect. The strong thriving
 state of your mint in putrid air seems to shew that the air is mended by taking something
 from it, and not by adding to it.*”——Dr. Priestley's Experiments and Observations
 on different Kinds of Air, p. 86—94.

* It must be confessed that sowing of Acorns, Beech Mast, Ash-Keys, &c. in the Autumn, when those seeds fall spontaneously from the trees, appears by much the most natural method; but the destruction made by the field-mouse upon those seeds, both at the time of sowing and during the winter, has induced many Gentlemen to prefer Spring-sowing to the Autumnal one. When this last is determined on, the acorns and other seeds must be carefully preserved during the winter; and, in forming the magazines, care must be taken to keep the different sorts apart from each other. It is not

4. But to pursue this to some farther advantage, as to what concerns the election of your seed, it is to be considered, that there is a vast difference (what if I should affirm more than an hundred years) in trees even of the same growth and bed, which I judge to proceed from the variety and quality of the seed: This, for instance, is evidently seen in the heart, procerity, and stature of timber; and therefore choose not your seeds always from the most fruitful trees, which are commonly the most aged, and decayed; but from such as are found most solid and fair. Nor, for this reason, covet the largest acorns, &c. but (as husbandmen do their wheat) the most weighty, clean, and bright. This observation we deduce from fruit-trees, which we seldom find to bear so kindly and plentifully from a sound stock, smooth rind, and firm wood, as from a rough, lax, and untoward tree; which is rather prone to spend itself in fruit (the ultimate effort, and final endeavour of its most delicate sap) than in solid and close substance to encrease the timber. And this shall suffice, though some haply might here recommend to us a more accurate microscopical examen, to interpret their most secret schematisms, which were an over nicety for these great plantations.

5. As concerning the medicating and infuication of seeds, or enforcing the earth by rich and generous composts, &c. for trees of these kinds, I am no great favourer of it; not only because the charge would much discourage the work; but for that we find it unnecessary, and, for most of our forest-trees, noxious; since even where the ground is too fertile, they thrive not so well; and if a mould be not proper for one sort, it may be fit for another. Yet I would not, by this, hinder any from the trial, what advance such experiments will produce: In the mean time, for the simple imbibition of some seeds and kernels, when they prove extraordinary dry, as the season may fall out, it might not be amiss to macerate them in milk

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customary to preserve the acorns, &c. in the manner recommended by Mr. Evelyn; but, as he always speaks from experience, his method should not be rashly condemned. Our Seedsmen, when they find it necessary to preserve their acorns for Spring-sowing, lay them thin upon a boarded floor; in which situation, if full ripe, they will retain their vegetative power during the winter. Ash-Keys being subject to grow mouldy, should be sown as soon as gathered. The cones of Fir, Beech Mast, &c. as they are not subject to heat, may be kept in bags, or may be spread upon a dry floor in the manner of acorns, till the Seminary calls for them in the Spring.—The manner of sowing the various seeds of forest-trees will be explained in the next chapter, which treats of the SEMINARY and NURSERY.

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or water only, a little impregnated with cow-dung, &c. during the space of twenty-four hours, to give them a spirit to sprout and chet the sooner, especially if you have been retarded in your sowing without our former preparation: But concerning the mould, soiling, and preparations of the ground, I refer you to my Treatise of Earth, if what you meet with in this do not abundantly encounter all those difficulties.

6. Being thus provided with seeds of all kinds, I would advise to raise woods by sowing them apart in several places destined for their growth, where the mould being prepared, as I shall shew hereafter, and so qualified, if election be made, as best to suit with the nature of the species, they may be sown promiscuously, which is the most natural and rural; or in straight and even lines, for hedge-rows, avenues, and walks, which is the more ornamental: But because some may choose rather to draw them out of Nurseries; that the culture is not much different, nor the hinderance considerable, provided they be early and carefully removed, I will finish what I have to say concerning these trees in the Seminary, and shew how they are there to be raised, transplanted, and governed till they can shift for themselves.

AIR.

As to the Air and Water, they are certainly of almost as great importance to the life and prosperity of trees and vegetables; and therefore it is to be wished for and sought (where they are defective, and they commonly follow, or indicate the nature of the soil, or the soil of them, taking soil here promiscuously for the mould) that they be neither too keen or sharp, too cold or hot, not infected with fogs and poisonous vapours, or exposed to sulphurous exhalations, or frigidiferous winds, reverberating from hills and other ill-situate eminencies, pressing down the incumbent particles so tainted or conveyed through the inclosed vallies; but such as may gently enter and pervade the canals and vessels, destined and appointed for their reception, intromission, respiration, and passage, in almost continual motion: In a word, such as is most agreeable to the life of man (the inverted head compared to the root, both vegetables and animals alike affected with those necessary principles, Air and Water, soon suffocated and perishable for the want of either) duly qualified with their proper mixts, be it nitre, or any other vegetable matter, though we neither see, nor distinctly taste it; nay, so universally pervading and necessary, that all aquatics, how deeply soever submerged, could not subsist without this active element the air.

The same qualification is, as we said, required in water, to which it is of so near alliance, and whose office it is not only to humectate, mollify, and prepare both the seeds and roots of vegetables, to receive the nutrition, pabulum, and food, of which this of water as well as air are the proper vehicles, insinuating what they carry into the numerous pores, and through the tubes, canales, and other emulgent passages and percolations to the several vessels, where (as in a stomach) it is elaborated, concocted, and digested, for distribution through every part of the plant; and therefore had need be such as should feed, not starve, infect, or corrupt; which depends upon the nature and quality of the mixed, with what other virtue, spirit, mineral, or other particles, accompanying the purest springs (to appearance) passing through the closest strainers. This therefore requires due examination, and sometimes exposure to the air and sun, and accordingly the crudity and other defects taken off and qualified: All which rain-water, that has had its natural circulation, is greatly free from, so it meets with no noxious vapours in the descent, as it must do passing through fuliginous clouds of smoke and soot, over and about great cities, and other volcanos, continually vomiting out their acrimonious, and sometimes pestiferous fervor, infecting the ambient air, as it perpetually does about London and for many miles adjacent, as I have shewn in my treatise entitled *Fumifugium*.

In the mean time, whether water alone is the cause of the solid and bulky part, and consequently of the augmentation of trees and plants, without any thing more to do with that element (though as it serves to transport some other matter) is very ingenuously discussed, and curiously enquired into by Dr. Woodward, in his *History of the Earth*, fortified with divers nice experiments, too large to be here inserted *. The sum is,

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* It is of the utmost consequence to determine what is the food of plants. Upon that question Philosophers have widely differed. From a number of experiments, accurately conducted, I am led to believe that all vegetables, from the hyssop upon the wall to the cedar of Lebanon, receive their principal nourishment from oily particles incorporated with water, by means of an alkaline salt or absorbent earth. Till oil is made miscible, it is unable to enter the radical vessels of vegetables; and, on that account, providence has bountifully supplied all natural soils with chalky or other absorbent particles. I say natural soils, for those which have been assisted by art are full of materials for that purpose; such as lime, marl, soap-ashes, and the volatile alkaline salt of putrid dunghills. It may be asked, whence do natural soils receive their oily

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that water, be it of rain or the river, (superior or inferior) carries with it a certain superfine terrestrial matter, not destitute of vegetative particles, which gives body, substance, and all other requisites to the growth and perfection of the plant, with the aid of that due heat which gives life

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particles? I answer, the air supplies them. During the summer months, the atmosphere is full of putrid exhalations arising from the steam of dunghills, the perspiration of animals and smook. Every shower brings down these oleaginous particles for the nourishment of plants.

The ingenious Mr. Tull, and others, have contended for earth's being the food of plants. If so, all soils equally tilled would prove equally prolific. The increased fertility of a well-pulverised soil, induced him to imagine that the plow could so minutely divide the particles of earth, as to fit them for entering into the roots of plants. An open soil, if not too light in its own nature, will always produce plentiful crops. It readily receives the air, rains, and dews into its bosom, and at the same time gives the roots of plants a free passage in quest of food. This is the true reason why land well tilled is so remarkably fruitful.—Water is thought, by some, to be the food of vegetables, when in reality it is only the vehicle of nourishment. Water is an heterogeneous fluid, and is no where to be found pure. It always contains a solution of animal or vegetable substances. These constitute the nourishment of plants, and the element in which they are minutely suspended, acts only as a vehicle, in guiding them through the fine vessels of the vegetable body. The hyacinth, and other bulbous roots, are known to perfect their flowers in pure water. Hence superficial observers have drawn an argument in favour of water being the food of vegetables. But the truth is, the roots, stem, and flowers of such plants are nourished by the mucilaginous juices of the bulb, diluted by the surrounding water. This mucilage is just sufficient to perfect the flower—and no more. Such a bulb neither forms seeds, nor sends forth off-sets. At the end of the season, it appears weak, shrivelled, and exhausted, and is rendered unfit to produce flowers the succeeding year. A root of the same kind, that has been fed by the oily and mucilaginous juices of the earth, essentially differs in every particular. It has a plump appearance, is full of mucilage—with off-sets upon its sides. All rich soils, in a state of nature, contain oil; and in those lands which have been under the plow for some years, it is found in proportion to the quantity of putrid dung that has been laid upon them, making an allowance for the crops they have sustained.—To set this matter in a clearer light, let us attend to the effects of manures of an oily nature, and we shall soon be satisfied that oil, however modified, is one of the chief things concerned in vegetation. Rape-dust, when laid upon land, is a speedy and certain manure, though an expensive one, and will generally answer best on a limestone land, or where the soil has been moderately limed. This species of manure is much esteemed by the farmer. It contains the food of plants ready prepared; but as it is not capable of loosening the soil by any fermentation, the lands upon which it is laid ought to be in excellent tilth. At present, that useful article of

and motion to the vehicles passage through all the parts of the vegetable, continually ascending, till (having sufficiently saturated them) it transpires the rest of the liquid at the summity and tops of the branches into the atmosphere, and leaving some of the less-refined matter in a viscid

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husbandry is much diminished in goodness, owing to the improved methods of extracting the oil from the rape. Heat and pressure are employed in a double degree.—Farmers that live in the neighbourhood of large towns use abundance of foot. It is an oily manure, but different from the former, containing alkaline salt in its own nature, calculated as well for opening the soil, as for rendering the oily parts miscible with water. It is observed that pigeons dung is a rich and hasty manure. These animals feed chiefly upon grains and oily seeds; it must therefore be expected that their dung should contain a large proportion of oil. The dung of stable-kept horses is also a strong manure, and should not be used until it has undergone the *putrid fermentation*, in order to mix and assimilate its oily, watery, and saline parts. Beans, oats, and hay, contain much oil. The dung of horses, that are kept upon green herbage, is of a weaker kind, containing much less oil. Swines dung is of a saponaceous and oily nature, and perhaps is the richest of the animal manures. When made into a compost and applied with judgment, it is excellent for arable lands. The dung of ruminant animals, as cows and sheep, is preferable to that of horses at grass, owing to the quantity of animal juices mixed with their food in chewing. And here I beg leave to remark in general, that the fatter the animal, *ceteris paribus*, the richer the dung. Human ordure is full of oil and a volatile alkaline salt. By itself, it is too strong a manure for any land; it should therefore be made into a compost before it is used. The dung of carnivorous animals is plentifully stored with oil. Animals that feed upon seeds and grains come next, and after them follow those which subsist upon grass only. To suit these different manures to their proper soils, requires the greatest judgment of the farmer, as what may be proper for one soil, may be highly detrimental to another.

In order to strengthen my argument in favour of oil being the principal food of plants, I must beg leave to observe, that all vegetables, whose seeds are of an oily nature, are found to be remarkable impoverishers of the soil, as hemp, rape, and flax; for which reason, the best manures for lands worn out by these crops, are such as have a good deal of oil in their composition; but then they must be laid on with lime, chalk, marl, or soap-ashes, so as to render the oily particles miscible with water.—The book of nature may be displayed, to shew that oily particles constitute the nourishment of plants in their embryo state; and, by a fair inference, we may suppose that something of the same nature is continued to them as they advance in growth. The oily seeds, as rape, hemp, liné, and turnip, consist of two lobes, which, when spread upon the surface, form the feminal leaves. In them the whole oil of the seed is contained. The moisture of the atmosphere penetrates the cuticle of the leaves, and, mixing with the oil, constitutes an emulsion for the nourishment of the plant. The

BOOK I. honey-dew, or other exudations (often perceived on the leaves and blossoms) anon descending and joining again with what they meet, repeat this course in perpetual circulation. Add to this, that from hence those regions and places, crowded with numerous and thick-standing

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sweetness of this balmy fluid invites the fly, against which no sufficient remedy has, as yet, been discovered. The oleaginous liquor being consumed, the feminal leaves decay, having performed the office of a mother to her tender infant. To persons unacquainted with the analogy between plants and animals, this reflection will appear strange. Nothing, however, is more demonstrable.—The leguminous and farinaceous plants keep their placenta, or feminal leaves, within the earth; in which situation they supply the tender germ with oily nutriment, until its roots are grown sufficiently strong to penetrate the soil.

It is usual to talk of the salts of the earth; but chymistry has not been able to discover any salts in land which has not been manured, though oil may be readily obtained from every soil, the very sandy ones excepted. Marl, though a rich manure, has no salts. It is thought to contain a small portion of oleaginous matter, and an absorbent earth, of a nature similar to limestone, with a large quantity of clay intermixed. Lime mixed with clay comes nearest to the nature of marl of any fictitious body that we know of, and may be used as such, where it can be had without much expence. By increasing the quantity of clay, it will make an excellent compost for a light sandy soil; but to make the ground fertile, woollen rags, rotten dung, or any oily manure, should be incorporated with it some time before it is laid on.—It is a received opinion, that lime enriches the land it is laid upon, by means of supplying a salt fit for the nourishment of plants; but by all the experiments that have been made upon lime, it is found to contain no kind of salt. Its operation therefore should be considered in a different light; by the fermentation that it induces, the earth is opened and divided, and, by its absorbent and alkaline quality, it unites the oily and watery parts of the soil. It also seems to have the property of collecting the acid of the air, which it readily forms into a neutral salt, of great use in vegetation. From viewing lime in this light, it is probable that it tends to rob the soil of its oily particles, and in time will render it barren, unless we take care to support it with rotten dung, or other manures of an oily nature. As light sandy soils contain but a small portion of oleaginous particles, we should be extremely cautious not to overdo them with lime; unless we can at the same time assist them liberally with rotten dung, woollen rags, shavings of horn, and other manures of an animal kind. Its great excellence, however, upon a sandy soil, is by mechanically binding the loose particles, and thereby preventing the liquid parts of the manure from escaping out of the reach of the radical fibres of the plants. Upon clay the effect of lime is different; for by means of the gentle fermentation that it produces, the unsubdued soil is opened and divided; the manures laid on readily come into contact with every part of it; and the fibres of the plants have full liberty to spread themselves. It is generally said that lime answers

forest-trees and woods (which hinder the necessary evolution of this superfluous moisture and intercourse of the air) render those countries and places more subject to rain and mists, and consequently unwholesome, as is found in our American plantations, as formerly nearer us in Ireland;

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better upon sand than clay. This observation will undoubtedly hold good as long as the farmer continues to lime his clay lands in a scanty manner. Let him treble the quantity, and he will then be convinced that lime is better for clay than sand. It may be justly answered, that the profits will not admit of the expence. I agree. But then it must be understood that it is the application, and not the nature of the lime, that should be called in question. Clay, well limed, will fall in water, and ferment with acids. Its very nature is changed. Under such agreeable circumstances, the air, rains, and dews are freely admitted, and the soil is enabled to retain the nourishment that each of them brings. In consequence of a fermentation raised in the soil, the fixed air is set at liberty, which, in a wonderful manner, promotes vegetation. It is the nature of lime to attract oils and dissolve vegetable bodies. Upon these principles we may account for the wonderful effects of lime in the improvement of black moorland. Moor-earth consists of dissolved, and half-dissolved, vegetable substances. It is full of oil. Lime assimilates the one and dissolves the other. Such lands, not originally worth fourpence *per* acre, may be made, by paring, burning, and liming, to produce plentiful crops of turnips, which may be followed with oats, barley, or grass-seeds, according to the inclination of the owner. These observations, however, are rather foreign to the present argument, to which I shall now return.

To the universal principle, oil, we must add another of great efficacy, though very little understood; I mean the nitrous acid of the air. That the air does contain the rudiments of nitre, is demonstrable from the manner of making salt-petre in the different parts of the world. The air contains no such salt as perfect nitre; it is a factitious salt, and is made by the nitrous acid falling upon a proper matrix. The makers of nitre form that matrix of the rubbish of old houses, fat earth, and any fixed alkaline salt. The universal acid, as it is called, is attracted by these materials, and forms true nitre, which is rendered pure by means of crystallization, and in that form it is brought to us. In very hot countries the natural earth forms a matrix for nitre, which makes the operation very short. It is observed that nitre is most plentifully formed in winter, when the wind is northerly: hence we may understand the true reason why farmers and nurserymen lay up their lands in high ridges during the winter months. The good effects of that operation are wholly attributed to the mechanical action of the frost upon the ground. Light soils, as well as the tough ones, may be exposed in high ridges, but with some limitation, in order to imitate the mud walls in Germany, which are found, by experience, to collect considerable quantities of nitre during the winter. After saying so much in praise of nitre, it will be expected that I should produce some proofs of its efficacy, when used as manure. I must confess that experiments do not give us any such proofs. Perhaps too large a quantity has been used; or

Book I. both since so much improved by felling and clearing these spacious shades, and letting in the air and sun, and making the earth fit for tillage and pasture, that those gloomy tracts are now become healthy and habitable. It is not to be imagined how many noble seats and dwellings in this nation of ours

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rather, it could not be restored to the earth with its particles so minutely divided, as when it remained united with the soil, by means of the chymistry of nature. I shall therefore consider this nitrous acid, or, as philosophers call it, the *acidum vagum*, in the light of a vivifying principle, with whose operation we are not yet fully acquainted.—A curious observer will remark, that there subsists a strong analogy between plants and animals. Oil and water seem to make up the nourishment of both. Earth enters very little into the composition of either. It is known that animals take in a great many earthly particles at the mouth, but they are soon discharged by urine and stool. Vegetables take in the smallest portion imaginable of earth; and the reason is, they have no way to discharge it. It is highly probable, that the radical fibres of plants take up their nourishment from the earth, in the same manner that the lacteal vessels absorb the nutriment from the intestines; and as the oily and watery parts of our food are perfectly united into a milky liquor, by means of the spittle, pancreatic juice, and bile, before they enter the lacteals, we have all the reason imaginable to keep up the analogy, and suppose that the oleaginous and watery parts of the soil are also incorporated, previous to their being taken up by the absorbing vessels of the plant. To form a perfect judgment of this, we must reflect that every soil, in a state of nature, has in itself a quantity of absorbent earth, sufficient to incorporate its inherent oil and water; but when we load it with fat manures, it becomes essentially necessary to bestow upon it, at the same time, something to assimilate the parts. Lime, soap-ashes, kelp, marl, and all the alkaline substances, perform that office. In order to render this operation visible to the senses: Dissolve one drachm of Russia pot-ash in four ounces of water, then add one spoonful of oil. Shake the mixture, and it will instantly become an uniform mass of a whitish colour, adapted to all the purposes of vegetation. This easy and familiar experiment is a just representation of what happens after the operation of Burn-baking, and consequently may be considered as a confirmation of the hypothesis advanced.—Let us attend to the process. The sward being reduced to ashes, a fixed alkaline salt is produced. The moisture of the atmosphere soon reduces that salt into a fluid state, which, mixing with the soil, brings about an union of the oily and watery parts, in the manner demonstrated by the experiment. When the under stratum consists of a rich vegetable mould, the effects of Burn-baking will be lasting. But when the soil happens to be thin and poor, the first crop frequently suffers before it arrives at maturity. The farmer therefore, who is at the expence of paring and burn-baking a thin soil, should bestow upon it a portion of rotten dung, or shambles manure, before the ashes are spread, in order to supply the deficiency of oily particles. In consequence of this prudent management, the crop will be supported during its growth, and the land will be preserved in health and vigour.—Hitherto I have considered

(to all appearance well situated) are for all that unhealthful, by reason of some grove or hedge-rows of antiquated dotard trees (nay, sometimes a single tuft only, especially the falling autumnal leaves neglected to be taken away) filling the air with musty and noxious exhalations, which being

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plants as nourished by their roots. I shall now take a view of them as nourished by their leaves. An attention to this part of the vegetable system is essentially necessary. Vegetables that have a succulent leaf, such as vetches, peas, beans, and buck-wheat, draw a great part of their nourishment from the air, and on that account impoverish the soil less than wheat, oats, barley, or rye, the leaves of which are of a firmer texture. Rape and hemp are oil-bearing plants, and, consequently, impoverishers of the soil; but the former less so than the latter, owing to the greater succulency of its leaf. The leaves of all kinds of grain are succulent for a time, during which period the plants take little from the earth; but as soon as the ear begins to be formed, they lose their softness, and diminish in their attractive power. The radical fibres are then more vigorously employed in extracting the oily particles of the earth, for the nourishment of the seed.

Vegetables being fixed to a place, have few offices to perform. An increase of body and maturation of their seed, seems all that is required of them. For these purposes, providence has wisely bestowed upon them organs of a wonderful mechanism. The anatomical investigation of these organs, is the only rational method of arriving at any certainty concerning the laws of the vegetable æconomy. Upon this subject Dr. Hales judiciously observes, "That as the growth and preservation of vegetable life is promoted and maintained, as in animals, by the very plentiful and regular motion of their fluids, which are the vehicles ordained by nature to carry nutriment to every part, it is therefore reasonable to hope that in them also, by the same method of enquiry, considerable discoveries may in time be made, there being, in many respects, a great analogy between plants and animals."

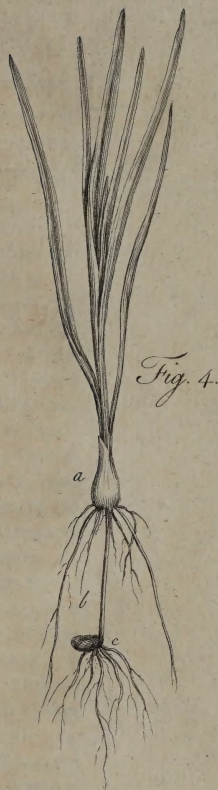
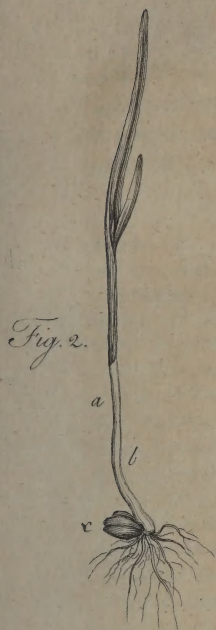
The seed of a plant, after it has dropt from the ovarium, may be considered as an impregnated ovum, within which the embryo plant is securely lodged. In a few days after it has been committed to the earth, we may discern the rudiments of the future plant. Every part appears to exist in miniature. The nutritive juices of the soil insinuate themselves between the original particles of the plant, and bring about an extension of its parts. This is what is called the growth of the vegetable body. With regard to this increase by addition and extension, there seems to be a great analogy between the animal and vegetable kingdoms. I have already endeavoured to prove that oily particles constitute the chief nourishment of plants and animals; and as I apprehend that much depends upon a proper investigation of the subject, I shall occasionally introduce some other proofs in support of my opinion. Every one knows that animals, instead of being strengthened, are enfeebled by a supply of improper nourishment. It is the same thing with regard to vegetables; but with this difference, that animals refuse whatever is improper, while vegetables, from their passive nature,

ventilated by glades cut through them, for passage of the stagnant vapours, have been cured of this evil, and recovered their reputation.

But to return to where we left: Water in this action, imbibed with such matter, applicable to every species of plants and vegetables, does not,

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must be content with what we give them.—The impregnated ovum of every animal, after it has passed down the Fallopian tube, and fixed itself to the bottom of the uterus, is found to contain the tender embryo within two membranes called Chorion and Amnion. In this situation the embryo could not long subsist without a supply of nourishment. Nature has therefore bestowed upon it a placenta and umbilical chord, through which the blood and juices of the mother are transmitted, for its preservation and increase. Seeds are disposed by providence nearly in the same manner. They have two coverings, answering to the Chorion and Amnion, and two lobes which perform the office of the placenta. These lobes constitute the body of the seed, and, in the farinaceous kinds, they are the flour of the grain. Innumerable small vessels run through the substance of the lobes, which, uniting as they approach the seminal plant, form a small chord to be inserted into the body of the germ. Through it the nutriment supplied by the placenta, or lobes, is conveyed for the preservation and increase of the embryo plant. In order that I may be clearly understood, it will be necessary to observe, that the lobes of farinaceous grains are fixed in the earth. They are therefore improperly termed seminal leaves, being rather the placenta, or cotyledons of the plant. On the contrary, vegetables that have an oily seed, as rape, hemp, line, and turnip, carry their lobes upward, and spread them upon the surface, in the form of broad leaves. These, though they perform the office of a placenta, are properly seminal leaves; and to this distinction I shall adhere.—Plate 1. Fig. 1. represents the body, or placenta, of a bean, with its germ, radicle, umbilical chord, and ramifications.—*a.* The germ. *b.* The body, or placenta, with the umbilical chord and ramifications. *c.* The radicle. Fig. 3. represents the placenta, or seed-leaves, of a turnip, with its radicle and germ.—*a.* The germ. *b.* The placenta, or seed-leaves. *c.* The radicle. Fig. 4. represents the germ of a grain of wheat, with its root and capsule, containing the milky juice for the nourishment of the tender plant.—*a.* The origin of the crown. *b.* The pipe of communication between the first roots and the crown. *c.* The grain with its first roots. To illustrate the subject of vegetation, let us take a view of what happens to a bean, after it has been committed to the earth. In a few days, sooner or later, according to the temperature of the weather and disposition of the soil, the external coverings open at one end, and disclose to the naked eye part of the placenta, or body of the grain. This substance consists of two lobes, between which the seminal plant is securely lodged. Soon after the opening of the membranes, a sharp-pointed body appears. This is the root. By a kind of principle, which seems to carry with it some appearance of instinct, it seeks a passage downward, and fixes itself



as we affirmed, operate to the full extent and perfection of what it gives and contributes of necessary and constituent matter, without the soil and temper of the climate co-operate, which otherwise retards both the growth and substance of what the earth produces, sensibly altering their qualities,

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into the soil. At this period the root is a smooth and polished body, and perhaps has but little power to absorb any thing from the earth, for the nutriment of the germ. The two lobes now begin to separate, and the germ, with its leaves, may plainly be discovered. As the germ increases in size, the lobes are further separated, and the tender leaves being closely joined, push themselves forward in the form of a wedge. These leaves take a contrary direction to the root. Influenced by the same miraculous instinct, if I may be allowed the expression, they seek a passage upward, which having obtained, they lay aside their wedge-like form, and spread themselves in a horizontal direction, as being the best adapted for receiving the rains and dews. The radicle, every hour encreasing in size and vigour, pushes itself deeper into the earth, from which it now draws some nutritive particles. At the same time the leaves of the germ, being of a succulent nature, assist the plant, by attracting from the atmosphere such particles as their tender vessels are fit to convey. These particles, however, are of a watery kind, and have not in their own nature a sufficiency of nutriment for the increasing plant.—Vegetables and animals, during their tender states, require a large share of balmy nourishment. As soon as an animal is brought into life, the milk of its mother is supplied in a liberal stream, while the tender germ seems only to have the crude and watery juices of the earth for its support. In that, however, we are deceived. The author of nature, with equal eye, watches over the infancy of all his works. The animal enjoys the milky humour of its parent. The vegetable lives upon a similar fluid, though differently supplied. For its use the farinaceous lobes are melted down into a milky juice, which, as long as it lasts, is conveyed to the tender plant by means of innumerable small vessels, which are spread through the substance of the lobes. These vessels uniting into one common trunk enter the body of the germ, and perform the office of an umbilical chord. Without this supply of balmy liquor, the plant must inevitably have perished, its root being then too small to absorb a sufficiency of food, and its body too weak to assimilate it into nourishment.—How beautiful is the semblance between this and the imagery of Lucretius!

Hinc ubi quæque loci regio opportuna dabatur,
Crescebant uteri terræ, radicibus apti;
Quos ubi tempore maturo patefecerat ætas
Infantum fugiens humorem, aurasque petissens,
Convertibat ibi natura foramina terræ,
Et succum venis cogebat fundere apertis
Consimilem lactis; sicut nunc femina quæque
Cum peperit, dulci repletur lacte, quod omnis
Impetus in mammas convertitur ille alimenti.

Lib. v. l. 807.

BOOK I.

if some friendly and genial heat be wanting to exert the prolific virtue: This we find, that the hot and warmer regions produce the tallest and goodliest trees and plants, in stature and other properties far exceeding those of the same species, born in the cold North; so as what is a giant in the one, becomes a pumilo, and, in comparison, but a shrubby dwarf in the other, deficient of that active spirit, which elevates and spreads its prolific matter and continual supplies without check, and is the cause of not only the leaves deserting the branches, whilst those trees and plants of the more benign climate are clad in perennial verdure; and those herbaceous plants, which with us in the hottest seasons hardly perfect their feeds before win-

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Turnips, and all the tribe of Brassicas, in opposition to the leguminous and farinaceous plants, spread their seminal leaves upon the surface. These leaves contain all the oil of the seed, which, when diluted by the moisture of the atmosphere, forms an emulsion of the most nourishing quality. How similar is this juice to the milk of animals! On account of its sweetness, the seminal leaves are greedily devoured by the fly. This demonstrably proves that oil constitutes the nourishment of plants in their tender state; and, by a fair inference, we may suppose that it also nourishes them as they advance in growth. A grain of wheat, as soon as the germ has made its appearance, shews the milky liquor to the naked eye; but the umbilical chord, with its ramifications, can only be discovered by the assistance of the nicest glasses. As the plant increases in size, the balmy juice diminishes, till at last it is quite exhausted. The umbilical chord then dries up, and the external covering of the grain appears connected to the root in the form of a shrivelled bag: See plate 1. Fig. 2. c.—Here is no mortality: From the moment that the seed is lodged in its parent earth, the vegetative soul begins its operations, and, in one continued miracle, proves the wisdom and bounty of an almighty providence.—It is worthy of observation, that farinaceous vegetables and oviparous animals are nourished, in their tender states, nearly in the same manner. We have already seen that the embryo plant is supported by the farina melted down into a milky liquor, and conveyed into its body by means of an umbilical chord, at a time when the radicle was unable to supply a sufficiency of nutriment. An oviparous animal, from the time that it is brought into light, seems to receive all its nourishment from without. This, however, is only an appearance. The yolk of the egg, remaining intire during incubation, is received into the body of the animal, and, in a manner similar to the passage of the milky juice of the vegetable, is slowly conveyed into the vessels of the tender chick. Thus a sweet nourishment is prepared at a time when neither the industry of the animal, nor the attention of its mother, could have procured a sufficient supply.—How beautiful are the general laws of providence! the more we explore them, the more we have cause for wonder and astonishment. Every thing is wisely disposed; nothing is fortuitous: all is order, regularity, and wisdom.

ter, require to be near their genial beds and nurse, and sometimes the artificial heat of the hot-bed. Lastly, to all this I would add that other chearful vehicle, light, which the gloomy and torpent North is so many months deprived of, the too long seclusion whereof is injurious to our exotics kept in the conservatories; since however tempered with heat, and duly refreshed, they grow sickly, and languish without the admission of light as well as air, as I have frequently found. *

CHAP. I.

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* If any number of plants are placed in pots in a room which only admits the light by a single hole, the stems will incline, or direct themselves towards that side. In thick forests, the young trees always lean to the side where the light penetrates. The new shoots of an espalier detach themselves from the wall which robs them of the air, the sun, and the light. It is in quest of the same excellent gifts of nature, that the lateral branches of trees abandoning the direction of the stem, spread and extend themselves in a direction parallel to the soil, even when planted on a declivity. Trunks are not, however, the only parts of plants which direct their course towards the air and the light of the sun. There are flowers, which, quitting their perpendicular direction, present their surface directly to that luminous body, and follow it in its diurnal course. This sort of motion has been called by some writers, *NUTATION*; and the plants which are subject to it, have been termed *Heliotropæ*; that is, turning with the sun. The story of the sun-flower, in Ovid's *Metamorphoses*, is confirmed by daily observation. Thomson beautifully describes its affection.

But one, the lofty follower of the sun,
Sad when he sets, shuts up her yellow leaves,
Drooping all night; and, when he warm returns,
Points her enamour'd bosom to his ray.

Most of the discous flowers, by some power unknown to us, follow the sun in his course. They attend him to his evening retreat, and meet his rising lustre in the morning with the same constant and unerring law.

CHAP. II.

*Of the SEMINARY; and of TRANSPLANTING.*BOOK I.
SEMINARY

1. *QUI vineam, vel arbutum constituere volet, Seminaria prius facere debet*, was the precept of *Columella*, lib. iii. cap. v. speaking of vineyards and fruit-trees; and doubtless we cannot pursue a better course for the propagation of timber-trees: For though it seem but a trivial design, that one should make a nursery of foresters; yet it is not to be imagined, without the experience of it, what prodigious numbers a very small spot of ground, well cultivated, and destined for this purpose, would be able to furnish towards the sending forth of yearly colonies into all the naked quarters of a Lordship or Demesne; being, with a pleasant industry, liberally distributed amongst the tenants, and disposed of about the hedge-rows, and other waste and uncultivated places for timber, shelter, fuel, and ornament, to an incredible advantage. This being a cheap and laudable work, of so much pleasure in the execution, and so certain a profit in the event; to be but once well done (for, as I affirmed, a very small plantarium or nursery, will, in a few years, stock a vast extent of ground) hath made me sometimes in admiration at the universal negligence, as well as raised my admiration, that seeds and plants of such different kinds, should, like so many tender babes and infants, suck and thrive at the same breasts; though there are some indeed will not so well prosper in company, requiring peculiar juices: But this niceness is more conspicuous in flowers, and the herbaceous offspring, than in foresters, which require only diligent weeding and frequent cleansing, till they are able to shift for themselves; and as their vessels enlarge and intosume more copious nourishment, often starve their neighbours. Thus much for the Nursery and Conseminea Silva.

2. Having therefore made choice of such seeds as you would sow, by taking and gathering them in their just season, that is, when dropping ripe, and, as has been said, from fair thriving trees, and found out some fit place of ground, well fenced, respecting the south-east, rather than the full south, and well protected from the north and west, let it be broken

up the winter before you sow, to mellow it; especially if it be a clay, and then the furrow should be made deeper, or so at least as you would prepare it for wheat: Or you may trench it with the spade, by which means it will the easier be cleansed of whatsoever may obstruct the putting forth, and insinuating of the tender roots.

Qui ferere ingenuum volet agrum,
Liberat prius arva fruticibus;
Falce rubos, filicemque resecat. BOETH. lib. ii. *Met.*

He that for wood his field would sow,
Must clear it of the shrubs that grow;
Cut brambles up, and the fern mow.

Having given it a second stirring, immediately before you sow, cast and dispose it into rills, or small narrow trenches, of four or five inches deep, and in even lines, at two feet interval, for the more commodious runcation, hawing, and dressing the trees: Into these furrows, about the new or increasing moon, throw your Oak, Beech, Ash, Nuts, all the glandiferous seeds, mast and key-bearing kinds, so as they lie not too thick, and then cover them very well with a rake, or fine-toothed harrow, as they do for pease: Or, to be more accurate, you may set them as they do beans, especially the Nuts and Acorns, and that every species by themselves, for the Roboraria, Glandaria, Ulmaria, &c. which is the better way*: This is to be done at the latter end of October, for the autumnal sowing, and in the lighter ground about February, for the vernal. For other semina-

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* The most natural, direct, and general way of raising trees and plants is from seeds. In order to this, proper soils must be prepared for them, as suitable as possible to their respective natures; and when the ground is ready, and properly furnished with the embryo plants, it is properly and significantly called the Seminary. The size of the seminary should be in proportion to the quantity of seeds to be raised; the land should be good, and the situation ought to be warm, and well defended; for many trees, though hardy enough afterwards, are nevertheless frequently tender when young. The situation of the seminary should be as near the nursery as possible; though if this is not convenient, neither the seminary nor the nursery need be stationed near the house or other works: Let, therefore, a fertile mead or rich pasture, lowly situated, be sought after for the purpose, in a place not conspicuous to the view from any part of the pleasure-garden, if possible; and if this cannot be had, let it be intercepted with trees, stationed a little either on one or both sides at pleasure, so as to give it the

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tions in general, some divide the spring in three parts, the beginning, middle, and end; and the like of the autumn, both for sowing and planting, and accordingly prepare for the work such nursery furniture as seems most agreeable to the season.

Proinde nemus sparsa cures de glande parandum :
Sed tamen ante tuo mandes quam femina campo ;
Ipse tibi duro robustus vomere fossor
Omne solum subigat late, explanetque subactum.
Cumque novus fisco primum de germine ramus
Findit humum, rursus ferro verlanda bicorni
Consita vere novo tellus, cultuque frequenti
Exercenda, herbæ circum ne forte nocentes
Proveniant, germenque ipsum radicibus urant.
Nec cultu campum cunctantem urgere frequenti,
Et saturare fimo pudeat, si forte resistat
Culturæ : nam tristis humus superanda colendo est.

RAPINUS.

Then see your hopeful grove with Acorns sown ;
But e'er your seed into the field be thrown,
With crooked plow first let the lusty swain
Break up, and stubborn clods with harrow plane :
Then, when the stem appears, to make it bear,
And lighten the hard earth with hough, prepare :
Hough in the spring, nor frequent culture fail,
Lest noxious weeds o'er the young wood prevail.
To barren ground with toil large manure add ;
Good husbandry will force a Soil that's bad.

Note, that six bushels of Acorns will sow or plant an acre at one foot's distance : And if you mingle amongst the Acorns the seeds of Genista

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appearance of a plantation. I choose to have the seminary low, because these situations are always the warmest, and it will receive additional warmth from the trees intended to conceal it ; and I recommend it to be a rich soil, because the seeds will grow better in it, and will make finer trees afterwards ; so that when the situation is not well defended, nor the soil rich, the one must be assisted with plantations of hedges and trees all round it, and the other by the addition of good rotten dung.—Having fixed

Spinosa, or Furze, they will come up without any damage, and for a while prove a sufficient fence, and will be killed by the shade of the young Oaklings, before they become able to do them any prejudice.

One rule I must not omit, that you cast no seeds into the earth whilst it either actually rains, or that it be over fobb'd, till moderately dry.

To this might something be expected concerning the watering of our Seminaries and new Plantations; which indeed require some useful directions (especially in that you do by hand) that you pour it not with too great a

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upon the place for the seminary, let it be double dug, working the sward to the bottom; nevertheless, if the soil be too shallow for double digging (for you ought not to go below the depth of the natural mould) you must be content with digging it only a spit and a half deep. We may suppose this work to be done in the winter. In the spring, as the weeds arise, they must be constantly kept down; and about Midsummer, if the soil is not naturally very rich, some rotten dung should be spread all over the surface of the ground, which should be then trenched or double dug afresh. The sward by this time will be rotten; and by bringing it up to the surface, it will be reduced to a finer mould, and better qualified to answer the purposes it is designed for in the autumn. From Midsummer until September the ground must be kept clean from weeds; and just before the seeds are committed to it, it should be double dug afresh. At this time the parts must be wholly incorporated; the rotten dung found at the bottom must not be made wholly to occupy the top; neither must the rotten turf at top be laid all in the bottom; but the whole must be mixed as equally as possible; which may very easily be done, though double dug, by the careful attention of the person employed about this business. When this is done, the ground must be levelled, and the beds laid out for the different purposes wanted; reserving, nevertheless, such a proper portion of it as will be wanted for the reception of those seeds which are to be sown in the spring.—The seminary must be divided into different apartments, for the different sorts of seeds, according to their nature: Those seeds that are to be sown in autumn should be in a part by themselves; those in the spring in another. These also must again be separated: Seeds which remain until the second spring before they come up, should be all sown in beds contiguous to each other; and those also which often continue three years, must be sown by themselves, that the whole spot may be kept separate, entire, clean from weeds, and the dormant seeds no way incommoded by the trampling of labourers and persons employed in assisting in the proper management of those plants which have come up from seeds the first spring. Soon after any of the apartments have performed their office of exhibiting the plants, and these are all taken off for the nursery, the ground should be double dug, and lie fallow the summer following, manuring it with rotten dung, and double digging it about Midsummer, as

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stream on the stem of the plant, which washes and drives away the mould from the roots and fibres; but at such distance, as it may percolate into the earth, and carry its virtue to them, with a shallow excavation, or circular basin, about the stalk; and which may be defended from being too suddenly exhausted and drunk up by the sun, and taken away before it grow mouldy. The tender stems and branches should yet be more gently refreshed, lest the too intense rays of the sun darting on them, cause them to wither, as we see in our fibrous flower-roots newly set. In the mean time, for the more ample young plantations of forest and other trees, I should think the hydraulick engine called the *Quench-fire*, (described in the Phi-

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before. In the autumn it will be ready to be sown afresh; but this should always be with seeds of a different nature from those by which it was before occupied. — One caution, however, ought to be observed from the first setting off, or at least from the first sowing of the seeds: If rabbits or hares abound in or about the place where the Seminary is designed, it should be fenced with pales, walls, or any other fence, to keep them out, otherwise they will cause great devastation, by devouring the seedlings as they come up, or will so crop and stunt them, as that many of them will hardly ever become good trees afterwards.

The Seminary being now ready, it follows that the planter should be instructed in the manner of sowing and raising the seeds of forest-trees; and as Bradley, Miller, Hanbury, and Weston have published useful directions upon this head, I flatter myself that I shall be thought right in transcribing their authorities for the manner of raising the following trees from seed.

OAK.

The Oak, the Pride and Glory of the Forest, is an indigenous tree of this country, and suits itself to all sorts of soils. It is of slow growth; but its cultivation is of the utmost consequence to this nation. — In order to raise this tree, let the acorns be procured from straight thriving trees, when they are full ripe and begin to fall. In February or March (or in October, if autumnal sowing be more agreeable) prepare the beds four feet wide; rake the earth out into the alleys two inches deep, and draw lines across the bed at four inches asunder by a sharp-edged stick; on these lines lay the acorns at about three inches distance from each other; when the bed is finished, press the seeds gently down with the back of the spade to keep them in their places, then spread the earth over them two inches thick, and rake the beds even; by their being planted in rows four inches asunder, a two-inches hoe can pass betwixt the rows without hurting the plants, by which the weeds are more easily destroyed, and the stirring the earth so much will cause the plants to grow the more, which advantage is lost if they are sown broadcast. It will be necessary to place some traps in the alleys to catch the mice, particularly after autumnal sowing; the crows also are very fond of acorns; therefore it will be proper to guard against these

Isophical Transactions, number 128.) might be made very useful, if rightly managed, and not too violently pointed against any single trees, but so exalted and directed, as the stream being spread, the water might fall on the ground like drops of rain; which I should much prefer before the barrels and tumbral way. Rain, river, or pond-waters reserved in tubs or cisterns, simple or enriched, and abroad in the sun, should be frequently stirred, and kept from stagnation.

4. Your plants beginning now to peep, should be earthed up, and comforted a little, especially after breaking of the greater frosts, and when

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enemies, or all your labour will be lost.—For two years the plants may remain in the feed-bed, with only the care of weeding them constantly in summer, and spreading a little fresh earth and ashes among them against the winter, till they are two years old. They must then be transplanted, in March or October, either where they are to remain, or else into the nursery; if into the nursery, it must be in rows two feet and a half asunder, and each tree at eighteen inches distance, where they must be constantly hoed, and the ground digged between them before winter, till they are planted out for timber.

ELM.

The Wych Elm is the only one that ripens its seeds well in this country; it must be gathered the beginning of June, laid in a dry place for a few days, and then it will be fit to sow. After having formed the beds four feet wide, take out the earth, about two inches deep, and sift it into the beds again, except leaving about half an inch of it to cover the seeds with; rake it level again, and flat it a little with the back of the spade, then sow the seeds, and sift the remaining earth over them. When you have sown the seeds, the beds must be hooped, and covered with mats to screen them from the sun; but when it rains, take them off; and if it be very dry weather, the beds must be frequently and gently watered.—In about a month, many of the young plants will appear; towards September the mats may be taken away, but before winter they must be well weeded, and a quarter of an inch of ashes sifted over them. At spring the rest will appear, and during the summer they must be constantly weeded, frequently watered in dry weather, and have some earth sifted over them. The February following they must be taken out of the feed-bed and planted in rows three feet asunder, and each Elm at eighteen inches distance, where they are to remain with the usual care of digging between the rows, and hoeing the weeds in summer.

BEECH.

Gather a sufficient quantity of mast, about the middle of September, when it begins to fall; spread it upon a mat, in an airy place, for six days, to dry; and after that you may either proceed to sowing it immediately, or you may put it up in bags, in order

BOOK I. the swelling mould is apt to spue them forth; but when they are about an inch above ground, you may, in a moist season, draw them up where they are too thick, and set them immediately in other lines or beds prepared for them; or you may plant them in double fosses, where they may abide for good and all, and to remain till they are of a competent stature to be transplanted; where they should be set at such distances as their several kinds require: but if you draw them only for the thinning of your Seminary, prick them into some empty beds (or a plantarium purposely designed) at one foot interval, leaving the rest at two or three.

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to sow it nearer the spring; which method I would rather advise, as it will keep very well, and there will be less danger of having it destroyed by mice or other vermin, by which kinds of animals these seeds are greatly relished. The ground being ready for the seeds, line your beds out four feet wide, with alleys at a foot and a half or two feet broad, for this is the properest width for raising the seeds of all sorts of forest-trees; let the earth be raked out of each bed, one inch deep; and, after having levelled the bottom, and gently tapped it down with the spade, sow the seeds all over it, even and regular; then tap them down with the back of the spade, and cover the mould over them an inch deep. In the spring of the year, many of the young plants will make their appearance, whilst others will not come up till the spring following.—After they have been two years in the seminary, they must be planted in the nursery-way on some double-dug ground. The rows should be two feet and a half asunder, and the plants at eighteen inches distance in the rows. The rows ought to be kept clean of weeds in the summer, and dug between every winter. Here they may remain till they are to be planted out for continuance.

A S H.

Procure the keys from healthy young thriving trees in October or November; rake some of the earth off into the alleys, to lower the bed about an inch; sow the keys moderately thick, then throw the earth back again lightly with a spade, or else sift it over them, an inch thick, and rake it level; at spring with a very small light iron rake, (the teeth about one inch asunder) rake off the moss, pull up the weeds, and sift a little earth over them again; they will want no other care the first year, except weeding. The second spring, in the first open weather in February, rake off very gently the earth as before, sift fresh over them, about half an inch thick, and in March and April the young plants will appear in plenty. During the summer they must be constantly weeded, and in very dry weather, now and then watered; in October weed them again, and sift some coal-ashes half an inch thick over them; but if the heavy rains in the summer have laid the roots bare, it will be necessary to sift a little earth amongst them first. No persons, unless they have practised this method of sifting earth and ashes over their seedling plants before winter, can conceive the advantage they receive from it; it strengthens the stems, prevents moss from growing amongst

5. When your seedlings have stood thus till June, bestow a slight digging upon them, and scatter a little mungy half-rotten litter, fern, bean-haume, or old leaves among them, to preserve the roots from scorching, and to entertain the moisture; and then in March following (by which time it will be quite consumed, and very mellow) you shall chop it all into the earth, and mingle it together: Continue this process for two or three years successively, for till then the substance of the kernel will hardly be spent in the plant, which is of main import; but then (and that the stature of your young imps invite) you may plant them forth, carefully taking up their roots, and cutting the stem within an inch of the ground,

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them, and secures them from being turned out of the ground by the frost. The next spring prepare some beds six feet wide, with a path of two feet betwixt each; plant all of a size in each bed, at one foot square, first shortening the tap-roots and also the side ones; in this bed they must remain for two-years, hoeing the ground when any weeds appear, and against winter sprinkling a few ashes amongst them.—— After standing at this distance for two years, they will want removing; they must then be planted out into your nursery, in rows three feet asunder, and each plant at one foot distance, where they are to remain till they are wanted for planting out for good, or for felling; but observe to keep the weeds constantly down when small, for then a labourer with a Dutch hoe can clean near half an acre in a day, and your trees will thrive amazingly by such a practice.

LARCH.

In the winter let a sufficient quantity of cones be procured, and kept till the spring of the year. Just before sowing, let them be opened or torn into four quarters by a knife, the point of which must be thrust exactly down the centre, so that the seeds in their respective places may not be damaged. Formerly, great pains were bestowed in getting at the seeds, by cutting off the scales of the cones singly, and letting the seeds drop. This occasioned great expence to those who wanted a quantity of seeds; so that it is now wholly laid aside, for the more easy method of opening them with knives, and then threshing them. A certain price is generally allowed per thousand to the poor for opening them. When a sufficient quantity is opened, they should be threshed in a room, which will divide the scales, and dislodge the seeds, without injuring many of them. Three thousand cones will generally produce about a pound of good seeds. The cones being sufficiently broken, and the seeds threshed out, they should be winnowed or sieved, to have clear seeds; after which they will be ready for sowing in April.—— Let the seminary consist of a spot of fine light earth, and let the seeds be sown in beds a quarter of an inch deep. After the plants have made their appearance, they should be gently refreshed with water in dry weather, and carefully kept clean of weeds during the whole summer. By the autumn they will not have shot more than an inch or two; and in spring they should be pricked out in beds about three inches asunder. The

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(if the kind, of which hereafter, suffer the knife) set them where they are to continue: If thus you reduce them to the distance of forty feet, the intervals may be planted with Ash, which may be felled either for poles or timber, without the least prejudice to the Oak: Some repeat the cutting, we spake of, the second year, and after March (the moon decreasing) recut them at half a foot from the surface, and then meddle with them no more: But this (if the process be not more severe than needs) must be done with a very sharp instrument, and with care, lest you violate and unsettle the root; which is likewise to be practised upon all those which you did not transplant, unless you find them very thriving trees; and then it shall

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second spring they must be taken out of these beds with care, and planted in the nursery in rows three feet asunder, and the plants eighteen inches from each other; and here they may remain until they are fit to plant out for good, which will be about the second or third year after.—If they grow well in the nursery, I would advise to plant them where they are to continue, after having attained two years strength in that place, if the ground can possibly be prepared for their reception; since these trees always thrive best when removed small from the nursery, if they are of a sufficient size not to be injured by the weeds; if they are smaller, the owner must keep them clean.

CHESNUT.

Before you attempt planting any Chesnuts, whether foreign or English, put them into a tub of water, and if any swim they are not good. The middle of February draw four drills along each bed at a foot distance and five inches deep; place the nuts in them at about four inches asunder, and cover them well over; as the plants appear, weed them very carefully, and if you make use of an hoe, it must be done with great care, for fear of hurting the tender bark; but if any weeds break off within ground, a carpenter's chissel, about an inch broad, will be of great use in getting the roots up without damaging the plants. In this seminary they must stand two years, be well weeded and earthed up before winter, and then some ashes spread amongst them. In February they will want transplanting into the nursery (the ground being first double digged) in rows three feet asunder, and each plant at eighteen inches distance; after they have remained there another year, cut them all down to the ground, by which they will shoot very strongly with handsome straight stems, and overtake others which have not been cut down. Here they may remain four or five years, keeping them clean from weeds, and digging between the rows.

WALNUT.

Having marked the trees that produce the finest nuts, either for thinness of shell or goodness of taste, we must proceed to gather them when they begin to fall. But as collecting them by the hand would be tedious, they may be beat down by long poles prepared for that purpose. Having procured the quantity wanted, let

suffice to prune off the branches, and spare the tops; for this does not only greatly establish your plants, by diverting the sap to the roots, but likewise frees them from the injury and concussions of the winds, and makes them to produce handsome, straight shoots, infinitely preferable to such as are abandoned to nature and accident, without this discipline: By this means the Oak will become excellent timber, shooting into straight and single stems: The Chestnut, Ash, &c. multiply into poles, which

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them be preserved, with their husks on, in sand, till the beginning of February, which is the time for planting them. This is to be done in the following manner: Let drills be made across the seminary, at one foot asunder, and about two inches and a half deep, and let the nuts be put into them at the distance of about one foot. In the spring the young plants will come up; and here they should continue for two years, being constantly kept clear of weeds; when they will be of a proper size to plant out in the nursery. The ground should be prepared, as has been always directed, by double digging; and the trees being taken out of the seminary, and having their tap-roots shortened, should be planted therein, in rows two feet and a half asunder, and the plants at a foot and a half distance. Here they may remain, with the same culture as has been all along directed for the management of timber trees, till they are of a proper size for planting out for good.—If they are designed for standards to be planted in fields, &c. before they are taken out of the nursery they should be above the reach of cattle, which may otherwise wantonly break their leading shoots, though they do not care to eat them, on account of their extraordinary bitterness. They ought likewise to be removed with the greatest caution, and the knife should be very sparingly applied to the roots. They must also be planted as soon as possible after taking up; and this work should be always done soon after the fall of the leaf, in the manner that will be directed for planting out standard timber-trees.—If these trees are intended to form a wood, for which purpose they answer extremely well, I would advise to take them out of the nursery when they are about three or four feet high, and to plant them about three yards asunder; and, after their heads begin to touch, they should be thinned. By this means, these large and branching trees will be drawn up, with a beautiful stem, to a great height! At the last thinning of the trees, the standards should be left at about thirty feet distance: But if the owner expects to reap the benefit of the fruit, the distance he ought to leave them should be seven or eight feet more. Thus will the planter have a wood of walnuts every year rewarding him with its produce, (which is always ready money, being sold to those who supply the markets) till they are full grown to timber, and must be felled.

LIME.

Procure the seeds from the red-twigg'd Lime, by beating them down with a pole in October; spread them in a dry place for a few days before you sow them; prepare your beds four feet wide, and rake the earth out about an inch deep; level the bed,

Book I. you may reduce to standards at pleasure. To this I add, that as oft as you make your annual transplanting out of the nursery, by drawing forth the choicest stocks, the remainder will be improved by a due stirring and turning of the mould about their roots.

But that none be discouraged, who may, upon some accident, be desirous or forced to transplant trees, where the partial or unequal ground does not afford sufficient room or soil to make the pits equally capacious (and so

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and then sow them about an inch asunder, pressing the seeds down gently with the back of the spade, and cover them. At spring they will appear, and must be constantly weeded and watered a little in very dry weather; before winter, sift some ashes over them to destroy the moss; they must remain in the seed-bed two years, and then they will be fit to plant out into the nursery in rows two feet and a half asunder, and each tree at eighteen inches distance; but before they are planted, shorten the roots a little, and cut off any side-branches. In this manner they may remain for several years, (for they will bear removing at any size) with hoeing the weeds down in summer, and digging between them every year; but as you want them, it is better to take away every other tree, which will cause those which remain to have more air, and thrive better.

— HORSE-CHESNUT. —

Put the nuts in a tub of water, and throw away all that swim; plant them in the same manner as the other Chesnuts, except that they are better put in the ground in October, for if they are kept till spring many will miscarry; but then it will be prudent to set some traps to catch mice, who are very fond of them. At spring they will appear, and when one year old they must be taken up, the tap-roots shortened, and then planted in the nursery, in rows three feet asunder, and each plant at eighteen inches distance: but there is this difference from the other Chesnuts, that these make their whole shoot in about three weeks or a month's time, and after that only encrease in thickness; therefore during that period it would certainly forward them to give the ground an hoeing, though it was digged in the spring; and if the beginning of May should prove dry, which it sometimes does, to water them two or three times would not be improper.—Be careful not to prune these trees after they are planted, for they will not bear it; and their own beautiful natural shape indicates, that they want no assistance from art.

— SYCAMORE. —

In the autumn, when the keys are ripe, they may be gathered, and in a few days after sown, as has been directed for the ash, &c. In the spring the plants will appear, and make a shoot of about a foot and a half by the autumn following, if the ground of the seminary be tolerably good, and they are kept clean from weeds. The spring after they come up, they should be planted in the nursery, in rows two feet and a half asunder, and their distance in the rows must be one foot and a half. Here they may

apt to nourish and entertain the roots, as where are no impediments) the worthy Mr. Brotherton, (whom we shall have occasion to mention more than once in this treatise) speaking of the increase and improvement of Roots, tells us of a large Pinafter, two feet and a half in diameter, and about sixty feet in height, the lowest boughs being thirty feet above the ground, which did spread and flourish on all sides alike, though it had no root at all towards three quarters of its situation, and but one quarter only into which it expanded its roots so far as to seventy and eighty feet from the body of the tree: The reason was, its being planted just within the square angle of the corner of a deep, thick, and strong stone-wall, which was a kind of wharfing against a river running by it, and so could have nourishment but from one quarter. And this I likewise might confirm of two Elms, planted by me about thirty-five years since; which being little

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remain till they are big enough to plant out for good, with no farther trouble than taking off unfightly side-branches, and such as have a tendency to make the tree forked, except digging between the rows, which must always be done every winter.

MAPLE.

If a quantity of these trees are wanted, they may be raised in the same manner as the Sycamore, and managed accordingly.

MULBERRY.

This tree is propagated two ways; from seeds, and by layers. Where the former can be procured, it is the most expeditious way of raising great quantities; and whoever has a correspondence in the south of France, or in Italy, may, through that channel, obtain them. Having the seeds ready, let a fine warm border of rich mellow earth be prepared; and let this border be hooped, in order to support mats to defend the young plants, when they appear, from frosts. If no such border can be easily had, it will be proper to make a gentle hot-bed, and cover it with rich fat mould: This also must be hooped as the border. Then sow the seeds in little drills, about a quarter of an inch deep. The middle of March is the best time for this work; and when the young plants appear, which will be in about six weeks, they must be constantly covered with the mats in the night, if any appearance of frost presents itself, as there often is at that season. During the summer they should be kept clear from weeds, and covered from the extrem heat of the sun while the hot months continue. Whenever any cloudy or rainy weather approaches, the mats should be always taken off, that the plants may enjoy the benefit of it. By thus carefully nursing the beds, keeping them clear from weeds, watering the plants in dry seasons, covering them from the parching sun, and uncovering them again in the night, cloudy or rainy weather, the plants by autumn will be got pretty strong; though not so strong as to be left to them.

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bigger than walking-staves, and set on the very brink of a ditch or narrow channel, not always full of water, wharfed with a wall of a brick and half in thickness to keep the bank from falling in, are since grown to goodly and equally spreading trees, of near two feet diameter solid timber, and of stature proportionable. The difference between these, and that of the Pine, being their having one quarter more of mould for the roots to spread in; but which is not at all discovered by the exuberance of the branches in either part.—But to return to planting where are no such obstacles.

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Themselves. The following winter they will require some care. When the frosts approach, they must be carefully covered with the mats, as in the spring; for without this protection many of them would be injured, and the greatest part killed, at least down to the ground. In this bed they may stand two years, when they will be strong enough to plant out in the nursery. The ground for this purpose being double dug, the young plants should be set in rows, at two feet and a half distance, and one foot and a half asunder in the rows. There they may remain till they are of a sufficient size to plant out for good.

— H O R N B E A M. —

In the autumn the seeds are ripe; when, having gathered a sufficient quantity for the purpose, let them be spread upon a mat a few days to dry. After this, they should be sown in the seminary, in beds four feet wide, with an alley of about two feet, in the manner directed for raising the Ash. In this bed they will remain till the second spring before they make their appearance; and all the summer they lie concealed, the weeds should constantly be plucked up as soon as they peep; for if they are neglected they will get so strong, and the fibres of their roots will be so far struck down among the seeds, as to endanger the drawing many seeds out with them, on weeding the ground. After the young plants appear, they should constantly be kept clear of weeds during the next summer; and if they were to be now and then gently refreshed with water in dry weather, it would prove serviceable to them. In the spring following they may be taken out of these beds, and planted in the nursery.

— M O U N T A I N A S H, O R Q U I C K E N - T R E E. —

Having procured a sufficient quantity of berries, they should be sown, soon after they are ripe, in the seminary, about half an inch deep, in beds made as has been before directed. They frequently lie till the second spring before they make their appearance; and in the spring following may be planted out in the nursery.

— B I R C H. —

The common Birch is raised from seeds, and the varieties are continued by layers. The seeds should be gathered in the autumn before they drop from their scales, which will happen soon after they begin to open. In a day or two they should be sown in the seminary, in a superficial manner; and after they are come up, the plants should

6. Theophrastus, in his third book de Causis, cap. vii. gives us great caution in planting to preserve the roots, and especially the earth adhering to the smallest fibrils, which should by no means be shaken off, as most of our gardeners do, to trim and quicken them, as they pretend, which is to cut them shorter (though I forbid not a very small topping of the straggling threads, which may else hinder the spreading of the rest) not at all considering that those tender hairs are the very mouths and vehicles which suck in the nutriment, and transfuse it into all the parts of the tree; and that these once perishing, the thicker and larger roots, hard and less spongy, signify little but to establish the stem; as I have frequently experimented in Orange-trees, whose fibres are so very obnoxious to rot, if they take in the least excess of wet: And therefore Cato advises us to take care that we bind the mould about them, or transfer the roots in baskets, to preserve it from forsaking them; as now our nursery-men frequently do, by which they of late are able to furnish our grounds, avenues, and gardens in a moment with trees and other plants, which would else require many years to appear in such perfection: For this earth being already applied, and fitted to the apertures and mouths of the fibres, it

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be carefully kept clear of weeds for the first summer. The spring following they may be planted out in the nursery: The rows must be two feet and a half asunder, and the plants a foot and a half distant in the rows. Here they may continue till they are of a sufficient size to be planted out where they are to remain.

SCOTCH FIR.

The Scotch Fir is propagated by seeds, of which their cones afford great plenty. In order to get them out, the cones, which must be gathered in winter, should be preserved till the month of June, when they should be occasionally brought forth, and exposed to the utmost heat of the sun: This will occasion their scales to open, so that the seeds will easily shake out. A large carpet or oil-cloth is a very proper thing to lay them on, which will save the seeds that drop by turning the cones; for as often as the scales on one side of them are opened, the other side should be turned to the sun, to receive the same effect.—This is the method of procuring great quantities of these seeds, which will be ready to sow the spring following. But when numbers of these cones are obtained, and a gentleman, having his ground ready for their reception, is unwilling to wait another year before he sows his seeds, as there will be little fun by the time they should be sown, the cones may be laid before a gentle fire at some distance, which will occasion their scales to open, and the seeds to fall out of their cells. However, this manner of procuring the seeds is not so good as the former; because some of them will be in danger of being scorched, though the utmost care be

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will require some time to bring them in appetite again to a new mould, by which to repair their loss, furnish their stock, and proceed in their wonted œconomy, without manifest danger and interruption: Nor less ought our care to be in the making and dressing of the pits and fosses into which we design our transplantation, which should be prepared and left some time open to macerating rains, frosts, and sun, that may resolve the compacted salt, (as some will have it) render the earth friable, mix and qualify it for aliment, and to be more easily drawn in and digested by the roots and analogous stomach of the trees: This, to some degree, may be artificially done, by burning of straw in the newly-opened pits, and drenching the mould with water, especially in over-dry seasons, and by meliorating barren ground with sweet and comminuted latations. Let therefore this be received as a maxim, never to plant a fruit or forest-tree where there has

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taken; so that I would advise, when it is practised, not to wait till all the scales of each cone are opened, but, as soon as a few begin to gape, to beat out what seeds you can, and then proceed to the next in like manner, till you have got seeds sufficient. By this means the fire will not have time to injure the seeds, and you may be certain of what you have being pretty good. Here I take it for granted you are not in want of cones: If there are but few cones, and many seeds are wanted, the additional labour of cutting off the scales close to the centre must be applied.—But to proceed: Having obtained a quantity of good seeds, the best season for sowing them is the middle of April or May. The weather ought to be warm and dry at the time, and the mould fine and light. Beds should be made in the seminary three or four feet wide, and the seeds must be sown in these at a little more than a quarter of an inch in depth. In about six weeks the young firs will appear with the husk of the seeds on their heads; and then is the time to watch them carefully; for if the sparrows and other birds once take to them, they will destroy every plant as it comes up; nay, so fond are they of the husks on the heads of the young plants, that, having once tasted them, no scarecrow will terrify them, or art keep them off. In order, therefore, to secure your crop of Firs, it would be proper to have them, soon after they are sown, well netted, and strings of fewelling drawn across, that, before they have any temptation, the birds may be frightened to other quarters, and the plants, at their first appearance, remain unnoticed by them. As soon as all the plants are come up, and have parted with the husks from their heads, the nets and fewelling may be taken off; for the seedlings will be then entirely out of danger.—All this summer they will need no farther care than being kept clean from weeds; and in the latter end of March, or beginning of April following, they should be taken out of these beds, and pricked into others at three or four inches distance. At the time of their being first pricked out, being one year old from the seeds, you will find they have made no shoot, but are slender plants with small weak eyes; and by the spring following, being two years from sowing, few of them will have made a

lately been an old decayed one taken up, till the pit be well ventilated and furnished with fresh mould.

7. Pliny, the author of the Natural History, tells us, it was a vulgar tradition in his time, that no tree should be removed under two years old, or above three. Cato would have none transplanted less than five fingers in diameter; but I have shewed why we are not to attend so long for such as we raise of seedlings: In the interim, if these directions appear too busy or operose, or that the plantation you intend be very ample, a more compendious method will be the confused sowing of Acorns, &c. in furrows, two feet asunder, covered at three fingers depth, and so for three years cleansed, and the first winter covered with fern without any farther culture,

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shoot, but they will have employed this summer in strengthening the eye in order to make a bold push the summer ensuing, which will be in height about half a foot. The spring after, they should undergo a second removal into the nursery, where they ought to be planted a foot asunder, and at two feet distance in the rows; and this summer they will have shot another half foot. In the spring following, being now four years old, and one foot in height, if the ground designed for the plantation be ready, and there are no rabbits or hares, they may be planted out for good. But where these animals can get to them, I would advise their remaining in the nursery another year or two, till they are out of their reach; as I have frequently known plantations of these small plants wholly destroyed, the winter after planting, by hares, &c. If, therefore, they are suffered to remain another year in the nursery, having acquired strength of body, they will make a shoot that summer of near two feet; so that the plants, at five years old, will be about a yard high, which is a good size for removing.— If they stand another year, till they are six years old, they will shoot about two feet more, and be near five feet in height. But here it is to be observed, that the larger these trees grow, the more difficulty there will be in removing them; and where they are of a tolerable height, many will be lost in their removal, tho' the utmost care be taken.— Bleak and cold situations require the Firs to be planted from the seed-bed, of which a particular account will be given in the chapter upon the Fir.

WILD PINE.

This tree may be raised in the same manner as the Scotch Fir; and the cones should be prepared, and the seeds obtained according to the directions given for that tree. They should also be sown at the same time; and in about six weeks the young plants will appear. They will make a short shoot the first summer; and in the spring following they should be pricked out in the nursery, in beds at a foot asunder each way. After your plants have taken to the ground, they will want no farther care than keeping them clean of weeds, till the latter end of September, or beginning of April follow-

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unless you transplant them: But, as I shewed before in nurseries, they should be cut an inch from the ground, and then let stand till March the second year, when it shall be sufficient to disbranch them to one only shoot, whether you suffer them to stand, or remove them elsewhere. But to make an essay what seed is most agreeable to the soil, you may, by the thriving of a promiscuous semination, make a judgment of

Quid-quæque ferat regio, & quid quæque recuset.

What each soil bears, and what it does refuse.

Transplanting those which you find least agreeing with the place, or else by coping the starvelings in the places where they are newly sown, cause them sometimes to overtake even their untouched contemporaries.

Something may here be expected about the fittest season for this work
 * *Pomona.* of transplanting; of which having spoken in another treatise *, as well as in divers other places throughout this of Forest-trees, I shall need add little, after I have recommended the earliest removals, not only of all the

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ing; in either of which months they should be planted out for good, if possible; but if the ground cannot be got ready for their reception, they must undergo a second removal in the nursery way, otherwise they will mostly die when planted out; for it is difficult to make this tree thrive when grown large, if it has not been used to constant moving.

 WEYMOUTH PINE.

Weymouth Pines being the most beautiful and most valuable of all the different sorts, every gentleman should plant some of them; it is from these trees that our ships are furnished with masts; the trees now produce good seeds here, therefore may be procured in greater plenty than they used to be; if these seeds are not sown in boxes or pots, which is by much the best way, they must be covered by mats in the heat of the day, during the violent heat of the summer, and uncovered every night; but if sown in pots or boxes, they may be more easily moved into the shade in summer, and brought back to a warmer situation in winter. April is the season for sowing these and other Pines.—After the plants are come up, sift some earth amongst them, if they appear weak or after heavy rains are beaten down, and before winter sift some ashes; then in spring plant them out into beds six feet wide, at eight inches asunder each way: There let them remain two years, being constantly weeded, and the earth frequently stirred with a small hoe, and before winter spread some ashes amongst them. The second spring they must be planted out into rows, eighteen inches asunder, and

sturdy forts in our woods, but even of some less tender trees in our orchards, Pears, Apples, Vulgar Cherries, &c. whilst we favour the delicate and tender Murals, and such as are pithy, as the Walnut, and some others. But, after all, what says the plain Wood-man, speaking of Oaks, Beech, Elms, Hawthorns, and even what we call Wild and Hedge fruit? "Set them, says he, at All-hallon-tide, and command them to prosper; set them at Candlemas, and intreat them to grow." Nor needs it explanation.

8. But here some may enquire what distances I would generally assign to transplanted trees: To this somewhat is said in the ensuing periods, and as occasion offers; though the promiscuous rising of them in forest-work, wild and natural, is to us, I acknowledge, more pleasing than all the

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each row at three feet distance, where they may stand two or three years; and if they are not then intended to be planted out where they are to remain, they must be taken up, and planted again at two feet distance from each other, and the rows three feet asunder. This tree will bear planting at six or eight feet high, without much danger, though not so many will live as if planted when only three feet high.

SWAMP PINE.

Its propagation is the same as the Weymouth Pine; and the planting out, and after-management of the trees, is also similar.

STONE PINE.

The Stone Pine produces large eatable seeds, and from their size they can easily be planted at what distance you please. In spring make some drills an inch deep, and at six inches asunder; in these plant the kernels about four inches from one another, and cover them with the earth near an inch thick; in dry weather they should be gently watered after the plants appear, and kept clean from weeds until the following spring, when they should be planted out in rows, two feet asunder, and one foot in the rows, where they must continue two years; after that they must be removed to where they are to remain, for they will not bear transplanting large.

SPRUCE FIR.

In the beginning of April, having got the seeds out of the cones, which are very long, let them be sown in a North border; for when they come up, by being constantly shaded all the summer in such a situation, they will shoot much stronger, and be better to prick out the spring following in the nursery. In about six or seven weeks after sowing, the young plants will appear, when they should be screened with the usual care from the birds, which otherwise would soon destroy them. By the autumn

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studied accuracy in ranging of them; unless it be where they conduct and lead us to avenues, and are planted for vistas, (as the Italian term is) in which case, the proportion of the breadth and length of the walks, &c. should govern, as well as the nature of the tree; with this only note, that such trees as are rather apt to spread than mount, as the Oak, Beech, Walnut, &c. be disposed at wider intervals than such as grow best in consort, as the Elm, Ash, Lime-tree, Sycamore, Fir, Pine, &c. Regard is likewise to be had to the quality of the soil for this work: V. G. If trees that affect cold and moist grounds be planted in hot and dry places, then set them at closer order; but trees which love dry and thirsty grounds at farther distance. The like rule may also guide in situations

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many of these young plants, if they are kept clean from weeds and watered in dry weather, will have shot three or four inches; and in spring they should be carefully taken out of their seed-beds, so that the fibres may by no means be broken off or injured. Being thus cautiously taken up, they should be as carefully planted in the nursery-ground, at the distance of one foot asunder each way. Here they may continue, with keeping them free from weeds, for two or three years, when they should be set out in the places where they are designed to remain.

SILVER FIR.

These trees are raised by sowing the seeds in a shady border, about the beginning of April. They will readily come up if the seeds are good; but as this is not often the case, especially when procured from the seedsmen, they should be sown very close, otherwise we may depend on having a very thin crop. The succeeding summer the plants will require no trouble, except keeping them clean from weeds; and the spring after that, they should be pricked out in beds at about four inches distance from each other. There they may stand for two years, when they should be planted in the nursery, in rows a foot asunder every way. The year, or at farthest two years, after they have been set in the nursery, they should be planted out for good; for if they are continued longer, many of them will die when planted out, and those which grow frequently lose their leading-shoot, or meet with so great a check as to be hardly able to get into a growing state for several years.

STRAWBERRY TREE.

The Arbutus, or Strawberry Tree, is best propagated from seeds; therefore when the fruit is ripe it should be gathered, and mixed with dry sand to preserve the seeds till the time of sowing. These seeds should be sown in pots, which should be plunged into an old bed of Tanner's bark that has lost its heat, covering the bed with glasses, &c. to keep out the frost. This should be done in December, and as the spring advances, if the pots are refreshed with water, the plants will come up the beginning of April.

exposed to impetuous winds and other accidents, which may serve for general rules in this piece of tactics. In the mean time, if you plant for regular walks, or any single trees, a competent elevation of the earth in circle, and made a little hollow, like a shallow basin, for the reception of water and refreshing the roots, will be required; sticking thorns about the edges, to protect them from cattle, were not amiss. Fruit-trees, thus planted, may be set round with beans, which will produce a small crop and shade the surface, perhaps, without detriment; but this more properly belongs to the garden. Most shrubs of Ever-green, and some trees, may be planted very near one another: Myrtles, Laurel,

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when they should be frequently, but sparingly, watered, and constantly kept clean from weeds.—As the summer advances, if the plants are shaded in the heat of the day, it will greatly promote their growth; but in warm weather they must be open all night to receive the dew, so should only be covered in the middle of the day; with this management the plants will rise to the height of five or six inches the first summer. The beginning of October, these plants may be shaken out of the pots, and their roots carefully separated, planting them singly in small pots filled with light earth; then plunge the pots into an old bed of tanners bark, under a common frame, observing to shade them from the sun in the middle of the day, and to give them water as they may require: in this bed the pots should remain during the winter, observing to expose the plants to the open air, at all times when the weather is favourable; but in frosty weather they must be covered, otherwise they will be in danger, if the season proves severe. The spring following, the plants may be removed to a very gentle hot-bed, which will require no other covering but mats. This will enable them to make strong shoots early in the summer, whereby they will be in a better condition to bear the cold of the succeeding winter: in this bed the plants may continue most part of the summer; for if the pots are taken out and set upon the ground, the smallness of their size will occasion the earth in them to dry so fast, that watering will scarcely preserve the plants alive; but if they are kept growing all the summer, they will be more than a foot high by the next autumn: it will also be adviseable to screen them from the frost during their continuance in pots, by plunging them into the ground in a warm place, and covering them with mats in bad weather.—When the plants are grown to be two or three feet high, you may shake them out of the pots, and plant them in the open ground in the places where they are to remain; but this should be done in April, that they may have taken good root before the winter, which would be apt to damage them, if newly planted; and as all the earth about their roots may be thus preserved, there will be no fear of succeeding at this season.

These observations upon sowing are taken from approved Authors that have wrote for the Southern Parts of this Island, which may account for the great distances recom-

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Bays, Cyprus, Yew, Ivy, Pomegranates, and others, also need little distance, and indeed whatever is proper to make hedges; but for the Oak, Elm, Walnut, Firs, and the taller timber-trees, let the dismal effects of the late hurricane, never to be forgotten, caution you never to plant them too near the mansion, or indeed any other house, that so, if such accident happen, their fall and ruin may not reach them.

9. To leave nothing omitted which may contribute to the stability of our transplanted trees, something is to be premised concerning their staking, and securing from external injuries, especially from winds and cattle;

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mended in planting from the seed-bed into the Nursery. Nurserymen in the Northern Counties do not allow much more than half the distance here recommended, and probably the greater coldness of their climate may make it necessary to crowd the plants closer together. Some other differences may be remarked which, in like manner, may be accounted for from the variation of climate.

Having thus given some particular directions for forming the Seminary, and afterwards stocking it with plants, it will be required to say something concerning the Nursery into which the infant seedlings must be removed at proper seasons, in order to train them for planting out; and in fixing upon a proper piece of ground for this purpose, I do recommend it to be a rich, deep, and stiffish mould, notwithstanding that the trees must afterwards be removed into a poorer soil. Reason teaches that young trees, growing luxuriously and freely in a good soil, will form vigorous and healthy roots, whereby they will be qualified to nourish themselves well; and when they come to be afterwards planted into worse land they will be enabled, from the strength of their constitution, to feed themselves freely with coarser food. On the contrary, young trees, raised upon poor land, by having their vessels contracted, and their outward bark mossy and diseased, will be a long time, even after being removed to a rich soil, before they attain to a vigorous and growing state: and as this is suggested by reason, experience confirms it to be true.—Having fixed upon a proper place, therefore, large enough to contain the quantity of trees wanted; in the first place let it be well fenced, either with hedges sufficient to keep out cattle, or pales or walls to keep out rabbits or hares; for without such defence a nursery will be soon demolished. Then trench the land all over, turning the turf down to the bottom of the trench, and covering it with the other mould; and in doing of this, be sure not to dig deeper than the natural soil; for if you go ever so little below it, that lying at the top will be ready to surround the roots of the different trees and plants as they are brought from the seminary, and will retard their striking root at first, if not totally kill them.—When the whole is thus trenched, or double dug, which must be in September, the surface should be smoothed, and laid out in quarters for the reception of the different trees taken from the Seminary.

against both which, such as are planted in copses, and for ample woods, are sufficiently defended by the mounds and their closer order, especially if they rise of seed: but where they are exposed in single rows, as in walks and avenues, the most effectual course is to empale them with three good quarter stakes of competent length, set in triangle, and made fast to one another by short pieces above and beneath, in which a few brambles being stuck, they will be abundantly secured, without that choaking or fretting, to which trees are obnoxious that are only single staked and bushed, as the vulgar manner is; nor is the charge of this so considerable as the great advantage, if we consider the frequent reparations which the other will require. Where cattle do not come, I find a good piece of rope tied fast about the neck of trees upon a wisp of straw to preserve it from galling, and the other end tightly streined to a hook or a peg in the ground (as the shrouds in a ship are fastened to the masts) sufficiently stabilishes my trees against the western blasts without more trouble, for the winds of other quarters seldom infest us: But these cords had need be well pitched to preserve them from wet, and so they will last many years. I cannot in the mean time conceal what a noble person has assured me, that in his goodly plantations of trees in Scotland, where they are continually exposed to much greater and more impetuous winds than we are usually acquainted with, he never stakes any of his trees, but upon all disasters of this kind, causes only his servants to re-dress and set them up again as often as they happen to be overthrown, which he has affirmed to me, thrive better than those which he has staked; and that at last they strike root so fast, as nothing but the ax is able to prostrate them: And there is good reason for this, in my opinion; for these concussions open the mould for the more ready insinuations of the roots in quest of nourishment. It is in another place I suggest, that transplanted Pines and Firs, for want of their penetrating tap-roots, are hardly consistent against these gusts after they are grown high, especially where they are set close, and in tufts, which betrays them to the greater disadvantage; and therefore such trees do best in walks, and at competent distances, where they escape tolerably well. Such therefore as we design for woods of them, should be sowed and never removed. In the mean time, many trees are also propagated by cuttings and layers; the Ever-greens about Bartholomew-tide; other trees within two or three months after, when they will have all the sap to assist them. Every body knows the way to do it is by slitting the branch a little way, and then to plunge it half a foot under good mould, leaving

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* There are various ways of layering trees, by which they may be multiplied. In order to raise great quantities, a sufficient number of trees should be set, to be headed down for stools. The ground, previous to planting, should be double dug; and the distances they ought to be set from each other should vary according to the size, height, or manner they are intended to grow before they are layered. The autumn after planting, each tree should be headed to within a few inches of the ground; and the summer following it will afford you plenty of young shoots proper for layering in the autumn.—Nevertheless, in many trees, it will be the best way to wait two years before you layer them, as each stool will afford you ten times the number of layers for the purpose; and the shoots being then many of them side-shoots, and weaker than the strong shoots from the stool the autumn before, will, for the most part, more readily strike root: For it is observable, that, in vigorous strong shoots, though only of one year's growth, after they have been layered a twelvemonth, even by slit-layering, the end of the divided part has only swelled, and struck no root; whereas smaller branches on the same tree, in the same space of time, have struck good root, and commenced plants fit to be taken off and removed to the nursery.—If the tree has grown from the stool two years, it must be splashed, to bring the head and branches down to the ground: All branches which cross, crowd, or any ways incommode each other, must be taken out, the ground should be excavated, and the head of each branch brought into the hollow, pegging it down firmly with a strong peg. The ends of the young shoots must be also shortened; for one eye only, for the most part, ought to be out of the ground, if you can tell how they will fall, as it will be a safer way to do it before the slit is made than afterwards. Then the slit, or twist, or whatever method you choose, must be entered upon; and when all the branches have undergone the operation, the mould must be carefully brought in among them, filling all the interstices, and levelling the whole so that an eye of each may just appear above ground; and if any shoot was before improperly shortened, it may now be done, holding it steady with the left thumb and finger, and cutting off an eye above the ground with the right. When the stool is completely layered in this manner, proceed to the next; and so on till the whole is completed.—By waiting two years after the heading of the plant for the stools, stools which perhaps would hardly have afforded you six plants will now yield sixty, or more, which is a sufficient encouragement for patience; nay, it is what ought to be practised by nursery-men, or gentlemen who want to raise large

out. If it be of soft wood, as Willows, Poplar, Alders, &c. you may CHAP. II. rake much larger trunchions, and so tall as cattle may not reach them; if harder, those which are young, small and more tender; and if such as produce a knur, or burry swelling, set that part into the ground, and be sure to make the hole so wide, and point the end of your cutting so smooth, as that, in setting, it violate and strip none of the bark; the other extreme may be slanted, and so treading the earth close, and keeping it moist, you will seldom fail of success: By the roots also of a thriving, lusty, and

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quantities of trees for sale, or to be planted out on their own estates.—And when this is the case, two quarters of sufficient size should be planted for stools, which coming in alternately, one with another, there may be an annual crop of layers for the purposes wanted.—As soon as the layers are taken off, all scraggy parts should be cut off from the stools; the heads should be refreshed with the knife; and two years after each stool will have afforded you a sufficient quantity of branches to be layered afresh; during which time the ground should be dug between the stools every winter; and in spring and summer the weeds should be hoed and cleared off, as often as they make their appearance.—Trees of much larger growth than two or three years may be splashed, brought down, and layered in this manner; and when they are grown too large for splashing, or the nature of the wood will not bear such an operation, they may be thrown on their sides. In order to effect this, the mould must be cleared away from the roots, on the side you intend the head to be brought down; and on this side a sufficient number of the roots must be cut, that the tree may be brought to the ground, leaving proper roots to continue it in a growing state; but for this very few will be sufficient. When the tree is brought down, all the young branches are to be layered in the former manner; and the year following, after they are taken off, the tree may be set upright again, cutting off all scraggy parts, side-branches that had been beat down, &c. and if you put fresh mould to the roots, it will put out as fresh as ever, and may, if you please, afterwards undergo a second operation in the like manner. If Magnolias, or large leafy Ever-greens, are layered in this manner, and the place is not well defended, it will be highly proper to make a stake-hedge of good height, at a small distance; otherwise the high winds having power on their large leaves, will frequently break them off before they have taken root.—Layers may be procured from trees of any size, by building scaffolding of proper height, to support tubs or pots filled with good earth, in which to layer the young branches: But this method is never practised unless on some very scarce tree, which is desired to be continued in its upright state, in as much beauty as possible. Neither, indeed, does it deserve to be adopted, unless on some such extraordinary occasions, not only on account of the expence of building the scaffolding, but of the constant trouble there will be in keeping the mould in the pots of a due moisture; for being elevated in that manner above the ground, it will dry very fast; and if it is not constantly watered, there will be little hope of your layers striking root in any reasonable time.—Layering

Book I. fappy tree, more may be propagated; to effect which, early in the spring, dig about its foot, and finding such roots as you may with a little cutting bend upwards, raise them above ground three or four inches, and they will in a short time make shoots, and be fit for transplantation; or in this work you may quite separate them from the mother-roots, and cut them off; by baring likewise the bigger roots discreetly, and hacking them a little, and then covering them with fresh mould, *matres* and mother-roots, *ne-potes succours*, *traduces* and rooted sets, may be raised in abundance;

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may be performed different ways; and trees of different texture are with different degrees of difficulty made to strike root. It is chiefly the young shoots of the preceding summer that the operation should be performed on; though all wood of loose texture or a spongy nature, if several years old, will grow very well.—The different ways of layering are: 1. By only making a small cavity and laying the shoot, whether young or old, in it, covering it over with fine mould. No other trouble than this slight layering is necessary for the increase of numbers of trees; such as Vines, Viburnums, Laurels, &c.—2. By twisting the shoots and slightly breaking the bark, numerous trees, which would not so readily take by the former method, will emit roots from the bruised parts; and, if the work be performed in the autumn, will commence good plants by the autumn following.—3. By thrusting an awl through the joint, the young shoots of many trees will sooner emit fibres from such wounded part, than if they had been otherwise laid in the ground; and in the course of the summer months will commence good plants, fit to be taken off and planted out.—4. Cutting out some small slips of bark, about a joint, will facilitate the shoot's striking root, and cause it the sooner to commence a plant.—5. Twisting of wire round the shoot, and pricking it in each side with the awl, has been recommended: I ever found the twisting unnecessary trouble, if the places were pricked with the awl, as the fibres always proceeded from the wounded places, and not from the parts surrounded by the wire; nevertheless, it may be serviceable in some cases, if the binding is not too hard, and the bark bruised or broken only with the wire: from such bruised parts fibres will come out, and then the pricking with the awl may be omitted.—6. Slit-layering, or that operation generally known among gardeners by the name of Tongue-Layering, is the most universal, the best, and the safest way of layering trees and plants, and is the only method to have recourse to when the former fail. It is known to every florist, who layers his carnations this way; and is practised by all gardeners for almost all sorts of trees which are not known to take by the simple method of barely laying the shoots in the ground.—Tongue-layering is performed by cutting with the knife half way through the shoot at right angles with it, and then turning the edge of it upwards, in a perpendicular direction, along the middle of the shoot, half an inch, an inch, or more, according to the nature of the stock that is to be layered. The horizontal cut in carnation-layering is always at a joint, and is for the most part practised by making the cut at a joint or end, where the performance is on trees. The more elegantly to

which drawing competent roots, will soon furnish store of plants, and this is practicable in Elms especially, and all such trees as are apt of themselves to put forth suckers; but of this more upon occasion hereafter. And now to prevent censure on this tedious and prolix introduction, I cannot but look on it as the basis and foundation of all the structure rising from this work and endeavour of mine; since from station, sowing, and continual culture and care, proceed all we really enjoy in the world. Every thing must have birth and beginning, and afterwards, by diligence and prudent care, formed and brought to shape and perfection. Nor is it

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perform this, make the horizontal cut half through; take out the knife and insert it below that cut, on the heel of the underwood, taking it off, and drawing the edge of the knife up the middle to the above length. By taking the heel of the underwood off, the tongue or bottom of the layer will sit more at ease; and by being surrounded with mould, will be the better disposed to strike root, should the parts by any accident be made to close again. The shoot being cut in this manner, should be next pegged down into the ground, a place being hollowed for the purpose; then the point of the layer should be brought forward, pointing towards the stem of the plant, which will separate the tongue from the other part of the branch; and to keep it at a distance, a small chip, or such like thing, may be inserted near the top of the slit, to keep it open. The mould must now be applied; and after heading the layer down to within one eye or more of the ground, the business is done.—In all layering, watering must be applied in summer to keep the ground moist, if dry weather should happen. The ground must always be kept clean from weeds; and there are few trees, if layered in this manner in the autumn, and with this management, which will not be ready for taking up the autumn following.—Layering on different plants may be performed at all times of the year; though, in general, the best season for it is in the autumn: Nevertheless, it may be done successfully for the most part in the winter or spring; and such plants as are found not to take readily by being layered at that season, should be layered in June or July, while they are tender, and performing their summer's shoot; but as the shoots will then be soft and herbaceous, they must not be too much watered, for that will cause them to rot; therefore it will be a better method to cover the surface over the layers with moss, which will prevent the soil from drying too fast, so that a little water, now and then, will be sufficient.—A large share of the vegetable creation may be also multiplied by planting only their slips or cuttings in the earth, and affording them management suitable to their respective natures. Some trees grow so readily this way, that it is the only method practised to raise any desired number of plants: The Willow, the Alder, the Poplar, &c. in all their varieties, are instances of the larger kinds; whilst the Sage, the Rosemary, the Rue-plant, and Southernwood, are some instances of the lower ligneous plants, that are, with the utmost facility, multiplied by slips. These will grow if planted at any time of the year; but such as will not prove so obsequious to your discipline, you must indulge in the season they

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enough to cast seeds into the ground, and leave them there, as the Ostrich^{*} does her eggs in the Lybian sands, without minding them more (because nature has deprived her of understanding); but great diligence is to be used in governing them, not only till they spring up, but till they are arrived to some stature fit for transplantation, and to be sent abroad, after the same method that our children should be educated, and taken care of from their birth and cradle; and afterwards, whilst they are under pedagogues and discipline, for the forming of their manners and persons, that they contract no ill habits, and take such plyes as are so difficult to rectify and smooth again without the greatest industry: For prevention of this in our seminary, the like care is requisite: whilst the young imps and seedlings are yet tender and flexible, they require not only different nourishment and

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require to be set in; the autumn for some, the spring for others; the early part of the summer for one plant, and the latter end of it for another; all which various circumstances will be particularly described under the article of the respective trees.

* It is commonly reported that the female Ostrich deposits her eggs in the sand, and covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to shift for themselves. Very little, however, of this history is true; no bird has a stronger affection for her young than the Ostrich, and none watches her eggs with greater assiduity. It happens, indeed, in those climates, that there is less necessity for the continual incubation of the female; and she more frequently leaves her eggs, as they are in no danger of being chilled by the weather; but though she sometimes forsakes them in the day, she always carefully broods over them in the night: and Tholben, who has seen great numbers of them at the Cape of Good Hope, affirms, that they sit upon their eggs like other birds, and that the male and female take this office by turns, as he had frequent opportunities of observing. Nor is it more true what is said of their forsaking their young after they are excluded the shell: On the contrary, the young ones are not able to walk for several days after they are hatched. During this time, the old ones are very assiduous in supplying them with grafs, and very careful to defend them from danger; nay, they encounter every danger in their defence. When pursued, this animal, instead of running directly forwards, and availing himself of his natural speed, takes his course in circles; while the hunters make a small course within, relieve each other, meet him at unexpected turns, and keep him thus employed for two or three days together: At last, spent with famine and fatigue, and finding all power of escape impossible, he endeavours to hide himself from those enemies he could not avoid, and covers his head in the sand, or the first thicket he meets. The means used by this bird to escape from its pursuers, and the manner of its death, may, with great propriety, be called *foolishness*.—Writers have hitherto been mistaken in the Natural History of the Ostrich.—See Job, ch. xxxix. with which compare Goldsmith on Animated Nature, vol. v. p. 49.

protection from too much cold, heat, and other injuries, but due and skilful management in dressing, redressing, and pruning, as they grow capable of being brought into shape, and of hopeful expectation, when time has rendered them fit for the use and service required, according to their kinds. He therefore that undertakes the nursery, should be knowing not only in the choice of the seeds, where, when, and how to sow them, but also in the time of gestation they require in the womb of their mother-earth before parturition, that so he may not be surprized with her delivering some of them sooner or later than he expects; for some will lie two, nay three years, before they peep; most others one, and some a quarter, or a month or two, whilst the tardy and less-forward so tire the hopes of the husbandman, that he many times digs up the plats and beds in which they were sown, despairing of a crop, at the very time they were ready to spring and come up, as I have found by experience to my loss. Those of hard shell and integument will lie longer buried than others; for so the Libanus Cedar, and most of the coniferous trees, shed their cones late, which sometimes remain two winters and as many summers, to open their scales glued so fast together, without some external application of fire or warm water, which is yet not so natural as when they open of themselves*. The same may be observed of some minuter seeds, even among the Olitories, as that of Parsley, which will hardly spring in less than a year; so Beet-seed, part in the second and third month, which upon inspecting the skins and membranes involving them, would be hard to give a reason for†. To accelerate this, they use imbibitions of piercing spirits, salts, emollients, &c. not only to the seeds, but to the soil, which we seldom find signify much, but rather produce abortion or monsters; and being forced to hasty birth, become nothing so hardy, healthful, and lasting as the conception and birth the plants receive from nature. These observations premised, I should now proceed to particulars, and boldly advance into the thickest

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* The cones of the Fir tribe should be laid in the sun early in the spring, which will open their scales and permit the seeds to be shook out: The practice of opening the cones, by laying them upon the floor of a malt-kiln, is highly to be condemned. This expeditious method is often practised by seedsmen—which rationally accounts for the badness of the Fir-seed sometimes purchased from wholesale dealers.

† In this particular, Mr. Evelyn seems to have been misinformed. Parsley-seed remains in the earth about four weeks, and the seed of the Beet generally appears in about ten days after sowing.

Book I. of the forest, did not method seem to require something briefly to be spoken of trees in general, as they are under the name of Plants and Vegetables, especially such as we shall have occasion to discourse of in the following work; though we also take in some less vulgarly known and familiar, of late indenized among us, and some of them very useful.

By trees then is meant a lignous plant, whose property is, for the most part, to grow up and erect itself with a single stem or trunk, of a thick compacted substance and bulk, branching forth large and spreading boughs, the whole body and external part covered and invested with a thick rind or cortex. These *Terræ-filii* are what we call Timber-trees, the chief subject of our following discourse.

Trees are distinguished into subordinate species. Frutices, or shrubs, are lignous trees, though of a lower and humbler growth, less spreading, and rising up in several stems, emerging from the same root, yielding plenty of suckers, which being separated, and often carrying with them some small fibre, are easily propagated and planted out for a numerous store; and this being clad with a more tender bark or fibre, seems to differ the frutex from other arboreous kinds; since as to the shaft and stems of such as we account dwarf and pumilo, they rise often to tall and stately trees, in the more genial and benign climes. *

Suffrutices are shrubs lower than the former, lignescant and more approaching to the stalky herbs, Lavender, Rue, &c. but not apt to decay so soon, after they have seeded; whilst both these kinds seem also little more to differ from one another, than do trees from them; all of them consisting of the same variety of parts, according to their kinds and structure, covered with some woody hard membranous or tender rind, suitable to their constitution, and to protect them from outward injuries; producing likewise buds, leaves, blossoms, and flowers, pregnant with fruit, and yielding saps, liquors, and juices, lachrymæ, gums, and other exsudations, though diversifying in shape and substance, taste, odour, and other qualities and operations, according to the nature of the species. To compare analogically, and describe minutely the various structure and contexture of their several vessels and organs, whose office it is to supply

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* For the opinion of different authors concerning the foundation of the distinction of vegetables into herbs, trees, shrubs, and under-shrubs, see the note upon page 3.

the whole plant with all that is necessary to its being and perfection, after a stupendous, though natural process, (not altogether different from creatures of animal life) would require an anatomical lecture, which is so learnedly and accurately done to our hands by Dr. Grew, Malpighius, and other ingenious naturalists. *

Besides this general definition, as to what is meant by trees, frutexes, &c. they are specially distinguished by other characters, viz. *Leaves, Buds, Blossoms*, &c. but more especially by what they produce of more importance;—by their fruit ye shall know them. V. G.

The Glandiferæ, Oaks and Ilexes, yield acorns and other useful excellences.—The Mast-bearers are the Beech, and such as include their seeds

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* Mr. Evelyn very justly observes, that there is a great analogy between the animal and vegetable creation; and this is apparently discovered in the similar manner that plants and animals propagate their respective species. It is allowed on all hands that animal conception is performed by the junction of the male and female; but it has remained a doubt with some, whether the union of the sexes be as essential in the propagation of vegetables. The great Linnæus has formed his noble system of botany upon the certainty that all plants have male and female organs, either growing upon the same tree, or upon different trees of the same species: His method is distinguished by the name of the Sexual System, and is now universally acknowledged. On its first appearance, it was received with all that caution that becomes an enlightened age; and nature was traced experimentally through all her variations before it was universally assented to. Tournefort refused to give it a place in his System; and Pontederæ, though he had carefully examined it, treated it as chimerical. The learned Dr. Alston, Professor of Botany in the University of Edinburgh, violently opposed it; but the proofs which Dr. Linnæus has given amongst the aphorisms of his *Fundamenta Botanica*, and farther illustrated and explained in his *Philosophia Botanica*, are so clear, that the mind does not hesitate a moment in pronouncing animal and vegetable conception to be the same: There is, however, this difference; in animals fruition is voluntary, but in vegetables necessary and mechanical. Another and more striking proof of the analogy between plants and animals may be drawn from observations made upon their infant states, at which early period they seem nourished and protected in a similar manner. For this the curious reader is requested to consult the note upon page 27, in which he will find sufficient proofs to convince him, that every blade of grass which we contemptuously tread upon, has been nurtured in its infancy by the hand of Providence, with as much care, and in the same manner, as Man himself with all his pre-eminence of station.

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and fruit in rougher husks, as the Chestnut-tree, &c.—The Walnut, Hazel, Avelans, &c. are the Nuciferæ.—To the Coniferæ, Resiniferæ, and Squamiferæ, belong the whole tribe of Cedars, Firs, Pines, &c.—Apples, Pears, Quinces, and several other Edulæ fruits, Peaches, Apricots, Plums, &c. are reduced to the Pomiferæ.—The Bacciferæ are such as produce Kernels, Sorbs, Cherries; viz. Holley, Bay, Laurel, Yew, Juniper, Elder, and all the berry-bearers.—The Genistæ in general, and such as bear their seeds in pods, come under the tribe of Siliquosæ.—The Laminaginæ are such as bed their seeds in a cottony down.

The Ash, Elm, Tilia, Poplar, Hornbeam, Willow, Salices, &c. are distinguished by their Keys, Tongues, Samera, Pericarpia, and Theca, small, flat, and husky skins including the seeds as in so many foliols, bags, and purses, fine membranous cases, Catkins, Palms, Julius's, &c. needleless to be farther mentioned here, being so particularly described in the chapters following, as are also the various Ever-greens and Exoticks.



The Oak Tree.

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J. Miller del. & Sculp.

C H A P. III.

The O A K. *

1. **R**OBUR, the Oak. I have sometimes considered it very seriously, CHAP. III.
 what should move Pliny to make a whole chapter of one only line, which is less than the argument alone of most of the rest in his huge volume; but the weightiness of the matter does worthily excuse him, who is not wont to spare his words or his reader. *Glandiferi maximè generis omnes quibus bonos apud Romanos perpetuus.* “Mast-bearing trees were principally “those which the Romans held in chiefest repute.” Lib. xvi. cap. iii.—And in the following, where he treats of Chaplets, and the dignity of the Civic Coronet, he says it might be composed of the leaves or branches of any Oak, provided it were a bearing tree, and had acorns upon it. It is then for the esteem which these wise and glorious people had of this tree above all others, that I will first begin with the Oak; and indeed it carries it from all other timber whatsoever, for building of ships in general, and in particular being tough, bending well, strong and not too heavy, nor easily admitting water.

2. 'Tis pity that the several kinds of Oak are so rarely known amongst us, that wherever they meet with *Quercus*, they take it promiscuously for our common Oak; as likewise they do *Δρὸς*, which comprehends all

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* The Oak, the pride and glory of the forest, demands our first attention, whether we consider the dignity of its station, or the variety of uses to which it is applied. Being a native of our island, it adapts itself in a wonderful manner to almost every soil, and, if well defended in its infancy, there are few places in which it will not grow to a national advantage. The Oak naturally delights in a rich, deep, and loamy soil; but lands of that quality are now more profitably employed in pasture and tillage. However, there are large portions of land in this kingdom which yield but a small profit to the owners. Such wastes, if situated near rivers, or navigable canals, are nobly calculated for raising Oaks which, at some distant period, may launch themselves into the Ocean, Guardians of Liberty and Commerce. Of the Oak there are various species, and Mr. Miller, in the last edition of his Dictionary, has described no less than seventeen kinds.

1. *QUERCUS (Robur) foliis deciduis oblongis supernè latioribus, sinubus acutioribus, angulis obtusis petiolatis, glandibus sessilibus.* Oak with oblong deciduous leaves, broader toward the top, having acute indentures, with obtuse angles, which have long

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Mast-bearing trees whatsoever (which I think they have no Latin word for.) And in the *Silva Glandifera* were reckoned the Chesnut, *Ilex*, *Efculus*, *Cerris*, *Suber*, &c. being various species rather than different trees. We shall here, therefore, give an account of four only, two of which are most frequent with us; for we shall say little of the *Cerris* or

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foot-stalks, and acorns sitting close to the branches. Quercus latifolia mas, quæ brevi pediculo est. C. B. P. 419. Broad-leaved male Oak, the fruit of which has short foot-stalks, or common Oak.

This is the common English Oak which, for ship-building and other æconomical uses, far excels all the kinds in the known world. The leaves of this sort have pretty long foot-stalks; the acorns have none, but sit close to the branches.

2. *QUERCUS (Fœmina) foliis deciduis oblongis obtusis, pinnato-sinuatis petiolis brevissimis, pedunculis glandorum longissimis. Oak with oblong, obtuse, deciduous leaves, which are winged, sinuated, and have very short foot-stalks, with a fruit growing upon long foot-stalks. Quercus cum longo pediculo. C. B. P. 429. Oak with long foot-stalks to the acorn.*

This sort is not so common here as the first, but in the wilds of Kent and Suffex are seen many large trees of this kind. The leaves of this are not so deeply sinuated as those of the first, nor are they so irregular, but the indentures are opposite, like the lobes of the winged leaves; these have scarce any foot-stalks, but sit close to the branches; the acorns stand upon very long foot-stalks, in which they differ from the common sort. The timber of this sort is accounted, by some, better than that of the first, and the trees when growing have a better appearance. These have been generally supposed to be feminal varieties, which have accidentally come from acorns of the same trees; I was long of this opinion myself, but having lately seen some young trees with acorns upon them, which were raised from acorns of the second sort, and finding they retain their difference, I am inclined to believe they are different.

3. *QUERCUS (Sempervirens) foliis oblongis sinuatis obtusis perennantibus, pedunculis glandorum longissimis. Oak with oblong, obtuse, indented leaves which are ever-green, having very long foot-stalks to the acorns. Quercus latifolia perpetuo virens. C. B. P. 420. Broad-leaved evergreen Oak.*

This sort grows upon the Appennines, and also in Swabia and Portugal. The leaves are broader, and not so deeply sinuated as those of the common Oak; they are of a lighter green on their upper side, and pale on their under; they have very short foot-stalks, and their points are obtuse; the acorns have very long foot-stalks, which frequently sustain three or four growing in a cluster.

4. *QUERCUS (Humilis) foliis oblongis obtusè dentatis, fructibus sessilibus conglomeratis. Dwarf Oak with oblong obtusely indented leaves, and fruit growing in clusters sitting close to the branches. Quercus humilis gallis binis ternis aut plurimis simul*

Ægilops, goodly to look on, but for little else: Some have mistaken it for Beech, whereas indeed it is a kind of Oak bearing a small round acorn almost covered with the cup, which is very rugged, the branches loaded with a long moss hanging down like dishevelled hair, which much annoys it. *Φάγος* is indeed doubtless a species of Oak; however by the Latins usual- CHAP. III.

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junctis. C. B. P. 420. Dwarf Oak with galls growing together by pairs, by threes, or in larger clusters.

This kind grows in the south of France and Italy; it is a low bushy Oak, which rises but six or seven feet high, sending out many slender branches the whole length, garnished with oblong leaves which are obtusely indented; they are about three inches long, and one and a half broad, standing upon slender foot-stalks; the acorns are small and grow in clusters, and the galls grow three or four together.

5. *QUERCUS (Cerris)* foliis oblongis lyrato-pinnatifidis, laciniis transversis acutis, subtus subtomentosis. Lin. Sp. Plant. 997. Oak with oblong leaves which are lyre-shaped, wing-pointed, and have transverse acute jags which are downy on their under side. *Quercus calyce hispido, glande minore*. C. B. P. 420. Oak with prickly cups and smaller acorns.

This grows in Burgundy; the leaves are oblong and pointed, and frequently indented in the middle like a lyre; they are jagged and acute-pointed, a little hoary on their under side, standing upon slender foot-stalks. The acorns are small, and have rough prickly cups.

6. *QUERCUS (Esculus)* foliis pinnato-sinuatis lævibus, fructibus sessilibus. Prod. Leyd. 80. Oak with smooth wing-indented leaves, and fruit sitting close to the branches. *Quercus parva* five *Phagus Græcorum & Esculus Plinii*. C. B. P. The small Oak or *Phagus* of the Greeks, and the *Esculus* of Pliny, commonly called the cut-leaved Italian Oak.

This sort grows naturally in Spain and Italy; the leaves are smooth, and deeply sinuated like winged leaves; some of the sinuses are obtuse, and others end in acute points; they have very short foot-stalks; the branches are covered with a purplish bark when young; the acorns are long and slender, the cups rough and a little prickly, sitting close to the branches. The acorns are sweet, and are frequently eaten by the poor in the south of France, who, in times of scarcity, grind them and make bread with the flour.

7. *QUERCUS (Ægilops)* foliis ovato-oblongis, glabris, serrato dentatis. Lin. Sp. Plant. 1414. Oak with oblong, oval, smooth, sawed, indented leaves. *Quercus calyce echinato, glande majore*. C. B. P. 420. Oak with a prickly cup and a larger acorn.

This grows naturally in the Levant, from whence the acorns are annually brought to Europe, where they are used for dyeing; these are called *Velani*, and the tree

Book I. ly applied to the Beech, whose leaf exceedingly differs from that of the Oak, as also the mast and bark rugged, and growing among the hills and mountains; the other in the valleys, and perhaps but few of them in Italy. Physicians, Naturalists, and Botanists should therefore be curious how they describe and place such trees, mentioned by Theophrastus and others,

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Velanida by the Greeks. It is one of the fairest species of Oak in the world: the trunk rises as high as the common Oak; the branches extend very wide on every side, and are covered with a greyish bark, intermixed with brown spots; the branches are closely garnished with oblong oval leaves, about three inches long, and almost two broad, which are deeply sawed on their edges; most of the saws or teeth turn backward, and terminate in acute points. The leaves are stiff, of a pale green on their upper side, and downy on their under; the acorns have very large scaly cups which almost cover them; the scales are ligneous and acute-pointed, standing out a quarter of an inch; some of the cups are as large as middling apples.

8. *QUERCUS (Rubra)* foliis obtusè-sinuatis setaceo-mucronatis Lin. Sp. Plant. 996. *Oak with obtuse sinuated leaves, terminated by bristly points.* *Quercus Esculi divisurâ, foliis amplioribus aculeatis.* Pluk. Alm. 309. tab. 54. fig. 4. *Oak with broad spiny leaves, which are divided like the Esculus.*

This sort grows naturally in Virginia, and in other parts of North-America. It arrives to a large size in the countries where it naturally grows; the bark is smooth, of a greyish colour, but that of the younger branches is darker; the leaves are six inches long, and two and a half broad in the middle, where they are broadest; they are obtusely sinuated, each sinus ending with a bristly point, of a bright green, standing upon short foot-stalks. The leaves continue their verdure very late in autumn, so that unless hard frost comes on early, they do not fall till near Christmas, and they do not change their colour long before. The acorns of this sort are a little longer, but not so thick as those of the common Oak.

9. *QUERCUS (Prinus)* foliis obovatis utrinque acuminatis sinuato-ferratis, denticulis rotundatis uniformibus. Hort. Cliff. 448. *Oak with oblong oval leaves which are pointed on both sides, and have sawed sinuses, with uniform roundish indentures.* *Quercus castaneæ foliis procera arbor Virginiana.* Pluk. Alm. 309. *The American Chestnut-leaved Oak.*

This grows naturally in North-America, of which there seems to be two kinds; one grows to a much larger size than the other, though this may be occasioned by the soil in which they grow; the largest sort grows in the rich low lands, where it becomes the largest tree of any of the Oaks in those countries. The wood is not of a fine grain, but is very serviceable; the bark is grey and scaly; the leaves are

under the same denomination as frequently they do, being found so very different when accurately examined. There is likewise the *Esculus*, which, though *Vitruvius*, *Pliny*, *Dalecampius*, and others take for a smaller kind, *Virgil* celebrates for its spreading and profound root; and this *Dalecampius* will therefore have to be the *Platyphyllos* of *Theophrastus*, and, as our

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five or six inches long, and two inches and a half broad in the middle, indented on the edges, and have many transverse veins running from the midrib to the borders; they are of a bright green, and so nearly resemble those of the *Chestnut-tree*, as scarcely to be distinguished from it. The acorns of this sort are very large, and their cups are short. The leaves of the other variety are not so large, nor so strongly veined, and the acorns are smaller and a little longer, which may arise from the soil.

10. *QUERCUS (Nigra)* foliis cuneiformibus obsoletè trilobis. Flor. Virg. 117. *Oak with wedge-shaped leaves, having three worn-out lobes.* *Quercus folio non ferrato in summitate quasi triangulo.* Catesb. Car. 1. p. 20. *The Black Oak.*

This grows naturally on poor land in most parts of North-America, where it never comes to a large size, and the wood is of little value. The bark is of a dark brown colour; the leaves are very broad at the top, where they have two waved indentures, which divide them almost into three lobes; they diminish gradually to their base, where they are narrow; they are smooth, of a lucid green, and have short foot-stalks. The acorns are smaller than those of the common *Oak*, and have short cups.

11. *QUERCUS (Alba)* foliis obliquè pinnatifidis, sinibus angulisque obtusis. Lin. Sp. Plant. 996. *Oak with oblique many-pointed leaves, having obtuse sinuses and angles.* *Quercus alba Virginiana.* Catesb. Car. 1. p. 21. tab. 21. *The White Oak of Virginia.*

This sort grows naturally in North-America, where the wood is esteemed preferable to any of their other sorts for building, being much more durable than any of them. The bark of this tree is greyish, the leaves are of a light green six or seven inches long, and four broad in the middle; they are regularly indented almost to the midrib; the indentures are obtuse, and have short foot-stalks. The acorns of this greatly resemble those of the common *Oak*.

12. *QUERCUS (Pbellos)* foliis lanceolatis integerrimis glabris. Flor. Virg. 149. *Oak with spear-shaped, entire smooth leaves.* *Quercus foliis oblongis non sinuatis.* Catesb. Car. 1. p. 17. *The Willow-leaved Oak.*

It grows naturally in North-America, where they distinguish two sorts; one of them is called the *Highland Willow Oak*, which grows upon poor dry land; the

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Botanists think, his Phegos, as producing the most edible fruit: But let us confine ourselves to the *Quercus Urbana*, which grows more upright, and, being clean and lighter, is fittest for timber; and the *Robur*, or *Quercus Sylvestris*, (taking *Robur* for the general name, if at least contra-distinct from the rest) which, as the name imports, is of a vast robust and inflexible nature, of an hard black grain, bearing a smaller acorn, and affecting to spread in branches, and to put forth his roots more above ground; and therefore in the planting, to be allowed a greater distance, viz. from twenty-five to forty feet, nay sometimes as many yards, whereas the other shooting up more erect, will be contented with fifteen. This

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Leaves are of a pale green and entire, shaped like those of the Willow-tree. The acorns are very small, but have pretty large cups. The other grows in low moist land, and rises to a much greater height; the leaves are longer and narrower, and the acorns are of the same size and shape, so that I suspect their difference is owing to the soil in which they grow.

13. *QUERCUS (Ilex) foliis oblongo-ovatis subtus tomentosis integerrimis.* Prod. Leyd. 81. *Oak with oblong, oval, entire leaves, which are downy on their under side.* *Ilex folio angusto non ferrato.* C. B. P. 424. *The narrow-leaved ever-green Oak.*

This species is generally known by the title of *Ilex*, or ever-green Oak; of this there are several varieties, which differ greatly in the size and shape of their leaves; but these will all arise from acorns of the same tree, as I have several times experienced; nay, the lower and upper branches of the same tree are frequently garnished with leaves, very different in size and shape from each other; those on the lower branches being much broader, rounder, and their edges indented and set with prickles, but those on the upper are long, narrow, and entire; so that I verily believe they are all but one species, except the *Kermes Oak*, which is undoubtedly a distinct sort. The leaves of the *Ilex* are from three to four inches long, and one broad near the base, gradually lessening to a point; they are of a lucid green on their upper side, but whitish and downy on their under, and are entire, standing upon pretty long foot-stalks; these remain green all the year, and do not fall till they are thrust off by young leaves in the spring. The acorns are smaller than those of the common Oak, but of the same shape.

14. *QUERCUS (Gramuntia) foliis oblongo-ovatis sinuato-spinosis sessilibus subtus tomentosis, glandibus pedunculatis.* Sauv. Monsp. 96. *Ever-green Oak with oblong, oval, prickly, indented leaves, which are woolly on their under side, and bear acorns with foot-stalks.* *Ilex folio agri-folii.* Bot. Monsp. 140. *The Holly-leaved ever-green Oak.*

This sort is supposed to be a different species; but of this I much doubt, having raised some plants from the acorns of the thirteenth, whose leaves are so like those of this, as not to be distinguished from them; these are shorter and broader than the

kind is farther to be distinguished by its fulness of leaves, which tarnish, and becoming yellow at the fall, do commonly clothe it all the winter, the roots growing very deep and straggling. The author of *Britannia Baccanica* speaks of an Oak in Lanhadron-Park in Cornwall, which bears constantly leaves speckled with white, and of another, called the Painted

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other, and approach in shape to those of the Holly-tree, and are also set with prickles on their edges.

15. *QUERCUS (Coccifera) foliis ovatis indivisis, spinoso-dentatis glabris.* Prod. Leyd. 80. *Oak with oval, undivided, smooth leaves, which are prickly and indented.* *Ilex aculeata, cocciglandifera.* C. B. P. 425. *Prickly Kermes Oak.*

This is the Oak, from which the kermes, or what is called scarlet grain, is collected, which is an insect that harbours on this tree. It grows naturally in Provence and Languedoc, where it is known by the title d'Avaux. This is of small growth, seldom rising above twelve or fourteen feet high, sending out branches on every side the whole length, so as to form a bushy shrub; the leaves are oval and undivided; they are smooth on their surface, but indented on their edges, which are armed with prickles like those of the Holly-tree. The acorns are smaller than those of the common Oak.

16. *QUERCUS (Virginiana) foliis lanceolato-ovatis integerrimis petiolatis semper-virentibus.* *Oak with spear-shaped, oval, entire leaves, which are ever-green, and have short-stalks.* *Quercus sempervirens foliis oblongis non sinuatis.* Banist. *Ever-green Oak with oblong leaves which are not sinuated, commonly called Live Oak in America.*

This kind grows naturally in Carolina and Virginia, where it rises to the height of forty feet. The grain of the wood is hard, tough, and coarse; the bark is greyish; the leaves are ovally spear-shaped, about three inches long and one and a half broad, entire, and of a dark green, standing upon short foot-stalks; they are of a thick consistence, and continue green all the year. The acorns are small, oblong, and have short cups; they are very sweet, so are eaten by the Indians, who lay them up in store for the winter; they also draw a very sweet oil from them, little inferior to that of sweet Almonds. This is called the Live Oak in America.

17. *QUERCUS (Suber) foliis ovato-oblongis indivisis serratis subtus tomentosis, cortice rimoso fungoso.* Hort. Cliff. 448. *Oak with oval, oblong, undivided leaves, which are sawed and woolly on their under side, and have a fungous cleft bark.* *Suber latifolium perpetuo virens.* C. B. P. 424. *The broad-leaved ever-green Cork-tree.*

This sort is the tree whose bark is the cork; of which there are two or three varieties, viz. one with a broad, another with a narrow leaf, which are ever-green; and

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Oak: others have since been found at Fridwood, near Sittingbourn in Kent; as also Sycamores and Elms in other places, mentioned by the learned Dr. Plot in his Natural History of Oxfordshire; which I only mention here, that the variety may be compared by some ingenious person thereabouts, as well as the truth of the fatal præ-admonition of Oaks

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there is one or two which cast their leaves in autumn; but the broad-leaved ever-green is the most common; the other may probably be only varieties arising by accident. The leaves of this are entire, of an oblong oval, about two inches long, and one and a quarter broad, sawed on their edges, and have a little down on their under sides; their foot-stalks are very short; these leaves continue green through the winter till the middle of May, when they generally fall off just before the new leaves come out, so that the trees are very often almost bare for a short time. The acorns are very like those of the common Oak. The exterior bark of this tree is the cork, which is taken off from the trees every eight or ten years; but there is an interior bark which nourishes the trees, so that the stripping off the outer is so far from injuring them, that it rather prolongs their life; for those whose bark are not taken off, seldom last longer than fifty or sixty years in health; whereas the trees which are barked every eight or ten years, will live a hundred and fifty years and more. The bark of the young tree is porous and good for little; however it is necessary to take it off when the trees are twelve or fifteen years old, without which the bark will not be good, and after eight or ten years, the bark will be fit to take off again; this second peeling is of little use, but at the third peeling the bark is in perfection, and will continue so many years, for the best cork is taken from the old trees. The month of July is the time for stripping off this bark, when the second sap flows plentifully; this operation is performed with an instrument similar to that for disbarking Oak.

Besides these seventeen Species of Oaks, enumerated by Mr. Miller, there is another described under the name of the Lucombe, or Devonshire Oak. Of this new kind there is a particular account given in the 62d volume of the Philosophical Transactions, in a letter from Mr. Holwell to Mr. Campbell. The following extract contains all that we yet know of this most surprizing species:

“ About seven years past, Mr. Lucombe sowed a parcel of acorns, saved from a
 “ tree of his own growth, of the iron or waincot species; when they came up he
 “ observed one amongst them that kept his leaves throughout the winter; struck with
 “ the phenomenon, he cherished and paid particular attention to it, and propagated,
 “ by grafting, some thousands from it, which I had the pleasure of seeing, eight days
 “ ago, in high flourishing beauty and verdure, notwithstanding the severity of the
 “ winter. Its growth is straight and handsome as a fir, its leaves ever-green, and the
 “ wood is thought, by the best judges, in hardness and strength, to exceed all other

bearing strange leaves: Besides, we may note that famous Oak of New-Forest in Hampshire, which puts forth its buds about Chriltmas, but withers again before night; and, which was ordered (by our late King Charles the Second) to be inclofed with a pale, as I find it mentioned in the laft edition of Mr. Camden's Britannia: Alfo another before this, which his grandfather,

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“Oak. He makes but one shoot in the year, viz. in May, and continues growing without interruption; whereas other Oaks shoot twice, namely, in May and Auguft; but the peculiar and inestimable part of its character is, the amazing quickness of its growth, which I imagine may be attributed (in fome degree at leaft) to its making but one shoot in the year; for I believe all trees that shoot twice, are for fome time at a stand before they make the fecond. I had the curiofity to take the dimenfions of the parent tree, (feven years old) and fome of the grafts; the firft meafured 21 feet high, and full 20 inches in the girt; a graft of four years old, 16 feet high, and full 14 inches in the girt; the firft he grafted is fix years old, and has outshot its parent two feet in height. The parent tree feems to promife his acorns foon, as he bloffoms, and forms his foot-ftalk strong, and the cup upon the foot-ftalk with the appearance of the acorn, which, with a little more age, will swell to perfection. This Oak is diftinguifhed, in this country, by the title of the Lucombe Oak; his shoots in general are from four to five feet every year, fo that he will, in the fpace of thirty or forty years, outgrow in altitude and girt the common Oak at an hundred. In two or three days I will forward to you, in a parcel, a branch which I cut off from the original tree, and another from the graft of four years old, alfo a dead branch of the Iron or Wainfcot Oak, juft to fhew that, from the fimilarity of the leaves, it is a descendant from that fpecies, although differing from it in every other particular. I fend you alfo, by the Exeter ftage, a fpecimen of the wood. I have a walking-pole full five feet long, a fide-shoot from one of the grafts, only one year and a half old. Several gentlemen round this neighbourhood, and in the adjoining counties of Cornwall and Somerfet, have planted them, and they are found to flourifh in all foils.” I am, &c.

Exeter, Feb. 24, 1772.

The Oak, in the Linnæan fyftem, is ranked in the clafs and order *Monæcia Polyandria*, which comprehends fuch plants as have male and female flowers on the fame plant, the male flowers having numerous ftamina.

We expect to find flowers on the common Oak tree in the fpring, though there is no exact time for the opening of the flowers or leaves, which depends much on the backwardnefs or forwardnefs of the feafon, or the difference of the fituation, or foil on which the trees ftand. I have obferved one Oak in full leaf, and at the fame time another, ftanding near it, without any fuch appearance, owing to the coldnefs or poverty of the ftratum on which it ftood, and which would have been unperceived, had not the tree fhewn it. But notwithstanding this, obfervation and experi-

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King James, went to visit, and caused benches to be placed about it; which giving it reputation, the people never left hacking of the boughs and bark till they killed the tree; as I am told they have served that famous Oak near White-Lady's, which hid and protected our late Monarch from being discovered and taken by the rebel soldiers who were sent to find him, after his almost miraculous escape at the battle of Worcester. In the mean time, as to this extraordinary precoseness, the like is reported of a certain Walnut-tree, as well as of the famous White-thorn of Glastonbury, and

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ence teach us, that these differences are very inconsiderable, and that the Oak which is most backward in putting forth its leaves, generally retains its verdure the longest in the autumn. In general, the flowers, which are of a yellowish hue, begin to open about the 7th of April; about the 18th the leaves appear, at which time the flowers are in full bloom; and about the 6th of May the leaves will be quite out, and remain until the autumnal frosts come on.

Oaks are generally raised in vast quantities together, called woods, where they thrive best, and arrive to a greater height than in hedge-rows, &c. We seldom see a good Oak in a hedge-row: They generally throw out large lateral branches, and form a spreading and beautiful head, but the trunk is for the most part very short; whereas in woods they draw one another up, and thus sociably aspire to such a height, as to be sufficient to answer any purposes in use.——Various are the opinions of mankind about the raising a wood of this tree. Some think they should never be removed, but remain where the acorn was first planted; others, again, believe that a wood should be raised by small plants of Oak taken from a nursery.——As each of these methods has its advantages, I shall therefore lay down rules, and shew the best mode of proceeding in raising an Oak wood both ways, that every one may choose that which he likes the best.

And, first, to raise a wood from acorns sown in the *Seminary*.

Let a proper spot in the seminary be prepared against the time the seeds are ripe. The soil should be loamy, fresh, and in good heart; and should be prepared by digging it well, breaking all clods, and clearing it of weeds, roots, large stones, &c. The acorns should be gathered from the straightest, most thriving, and beautiful trees; and if they remain until they fall off of themselves, they will succeed the better.

Having a sufficient quantity of well-ripened acorns for your purpose, proceed to prepare your beds in the ground that is just got ready for their reception. Mark out the beds with a line, four feet broad, and let there be an alley between each bed two feet wide; rake the earth out of the bed into the spaces designed for the alley, until the bed be sunk about two inches deep; sow your acorns in the bed, about three inches asunder, and gently press them down with the spade. Skim the earth that had been raked into the alleys over the acorns, until it be raised about two inches above them; then, after having dressed up the bed and alley, and gently pressed it down with the back of

Black-thorns in several places. Some of our common Oaks bear their leaves green all winter; but they are generally Pollards, and such as are sheltered in warm corners and hedge-rows. To speak then *particularly* of Oaks, and *generally* of all other trees of the same kind, by some infallible characters, notice should be taken of the manner of their spreading, sta-

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the spade, proceed to the next bed, and so on until the whole be finished. After this set traps at proper distances, all over the beds; for if the mice find the seeds out, they will soon destroy the greatest part: The crows also, should they discover them, will be extremely troublesome. As soon as these latter are perceived to frequent the beds, some of them must be shot, and hung upon gibbets *in terrorem*, with their wings expanded, and their bills pegged open, into which some gunpowder should be put. This work is best performed in February, though some prefer the autumnal months.

In about six weeks the plants will appear above ground; and in these beds they may remain for two years, without any further trouble or care than keeping them clear from weeds, and now and then refreshing them with water in very dry weather.

When the young trees are two years old, they will be of a proper size for planting out. Let us now see in what manner the ground designed for the wood is to be prepared to receive them. The best and only true way is by trenching, or double digging, as deep as the soil will admit of: But as this is a very expensive proceeding, and consequently would be practised by few, I shall point out another good method of preparing the ground for the reception of Oak plants for the raising a wood. This is to be done by proper plowing; and, if you choose it, the year before it is planted it may bear a crop of oats, barley, or turnips. By this means the sward will be effectually rotted, and the soil become more pliable for the other preparations. After the crop is off, let the ground be plowed very deep; and then harrowed with heavy harrows to break the clods: About the end of October let it be plowed again cross-ways, and harrowed as before. This is the season for planting of the sets; for the ground, by being thus cross-plowed deep and harrowed, will be in proper order for their reception. The manner of planting the sets is as follows:

First, carefully take the plants out of the seed-bed, shorten the tap-root, and take off part of the side-shoots, that there may be an equal proportion of strength between the stem and the root. If the wood is designed to be but small, ten, twenty, or thirty acres, then lines may be drawn, and the trees planted in rows, four feet distance from row to row, and the trees two feet asunder in the row: Each line must have a man and a boy for planting. The ground being made light and pliable with cross-plowing and harrowing, the man strikes his spade into the earth close to the line; he then takes it out and gives another stroke at right angles with it; then the boy, having a parcel of plants under his left arm, takes one with his right hand, and readily puts it into the crevice made by the spade at the second stroke: after this the man gently presses the mould to it with his foot, and thus the young Oakling is planted. He proceeds in the same manner to the next, and so on till all is finished. An active man

Book I. ture and growth, shape and size of the Acorn, whether single or in clusters, the length or shortness of the stalks, roundness of the cup, breadth, narrowness, shape and indentures of the leaf; and so of the bark, aspe-
 rous or smooth, brown or bright, &c. Though most, if not all of
 them, may rather be imputed to the genius and nature of the soil, situ-

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will, with his boy, plant 1500 or 2000 in a day; and while they are planting, others should be employed in taking up fresh sets from the seed-bed, sorting them, and preparing their roots. In short, a sufficient number of hands should be set to every part of this work, that the whole may be carried on with dispatch; for the ground cannot be too soon furnished with its plants, after it is in readiness to receive them; neither can the plants be put too early into the ground, after they are taken up from the seminary.—Those plants which are nearly of the same size should be made to occupy a large quarter together, and the weakest may be rejected, if there are enough for the purpose; or they may be left in the seminary a year longer, to gain strength.

The trees, either for small or large plantations, being in the ground, the first care should be to fence them well from cattle, and even, if possible, from rabbits and hares. The next should be, to keep them clear from weeds, that they may not be accommodated in their vegetating progress. Some land is more prolific of weeds than others; but in all they must be carefully watched, and destroyed at their first appearance. In small plantations hoeing may do; but where the plantations are large and noble, a double-shelving plow must be provided; and when the weeds are got two or three inches high, this must be drawn exactly down the middle of each row by horses with their mouths muzzled, somebody leading the foremost horse: this plow will effectually throw a ridge each way, so that the edge of it will be almost contiguous to the plants on either side. This being done, the whole surface of the ground will be changed, and the weeds all buried, except a few about the stems of the plants, which a man following the plow should be ready to cut or pluck up. In this manner the ground may lie until a fresh crop of weeds present themselves; when these are about three inches high, a common plow should be provided to go up one side of the row and down the other, to plow the ridges made by the double-shelving plow, into their former places, men following with hoes to destroy such weeds as are near the stems of the trees. Thus will the whole scene be changed again; the ground will appear as new tilled; and in this condition it may remain until the weeds call for the double-shelving plow a second time, which must also be followed alternately with the common plow, as occasion may require. By this means the ground will not only be kept clean of weeds, but the earth, by constant stirring, will be more replete with vegetating juices, the gentle showers will produce their good effects, the sun will have his influence, and all the powers of vegetation will combine to nourish and set forward the infant Oak. This work must be repeated every year, until the Oaks are of a height sufficient to destroy the weeds, which may be, perhaps, in three or four years, according to the goodness of the ground in which they are planted.—Thus you have

ation or goodness of the seed, than either to the pretended sex or species. And these observations may serve to discover many accidental varieties in other trees, without nicer distinctions, such as are fetched from professed botanists, who make it not so much their study to plant and propagate trees, as to skill in their medicinal virtues, and other uses; always

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a wood planted with young Oaks taken from the nursery or seed-bed. I shall now proceed,

Secondly, to the raising of an Oak wood from the acorn. Having the ground prepared, as before directed, for the reception of the young Oak plants, and having a sufficient quantity of acorns, all gathered from under the most vigorous, healthy, and thriving trees, proceed to their planting in the following manner: In the months of February and March, let lines be drawn across the ground for the rows, between which let there be four feet distance; but if this be thought too great an interval, the rows may be made at three feet, in which case the acorns must be put down at somewhat a greater distance from each other. Then having sticks properly rounded to make the holes, plant the acorns by the side of the lines, at the distance of ten inches asunder: let them be put down about two inches below the surface, and see that the earth be properly closed by the planting stick, to prevent the mice, or crows, from injuring the seed. In some places it is customary to sow the acorns after the plow; but where the ground happens to be stiff, great care should be taken not to cover the seed with too thick a furrow. As in this manner of sowing, the plants will come up very irregular, the mode of thinning must be left to the discretion of the planter. But to return.

The first year after planting the acorns, the weeds must be kept down by hoeing and hand-weeding; and this must be done early in the spring before the weeds get so strong as to hide the tender plants, which would occasion many of them to be destroyed in cleaning. It is also the cheapest, as well as the neatest husbandry, to take weeds down before they grow too large; for though the ground may require an additional hoeing in the spring, yet the weeds being hoed down when young, a man may hoe over a greater quantity of ground in a day: Weeds cut in their tender state immediately die; whereas, when they are suffered to grow old and strong, they frequently grow again, especially if rain falls soon after—perfect their seed in a short time—and thereby poison the soil of the whole plantation.

The second year of their growth, in such extensive plantations as require them, the double-shelving and common plow may be made use of, as before directed, to cultivate and keep the ground clean; and this culture should be attended to until the plants are become so large that it will not be in the power of the weeds to injure them. As plantations of Oaks from the acorn are rather precarious, it will be right to form a small seminary in the same field, to repair the intervals that may have miscarried. And here it may be necessary to observe, that this seminary should be taken from the

Book I. excepting our learned countryman Mr. Ray, whose incomparable work omits nothing useful or desirable on this subject, wanting only the accomplishments of well-designed sculps. There is likewise a kind of Hemeris, or Dwarf-Oak, (like the Robur vii. Clusii) frequent in New-England;

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best part of the field, and in the warmest situation, in order that the young plants may have good roots, without which they would make but an indifferent progress when planted out.

Having thus given directions for the raising of woods, both by young sets and from acorns, I now proceed to their future management, which must be the same in both.— And first, the rows being four feet asunder, and the plants two feet distant in the rows, they may stand in this manner for twelve or fourteen years, when every second plant may be taken out and sold for hoops or small poles. Now, though I say in twelve or fourteen years the plants will be of use for these purposes; yet this is only a general rule, as the different goodness of the land will make a great variation in the growth of the plants; and consequently, if the trees take to growing well, they will want thinning sooner. This business, therefore, must be left to the discretion of the person intrusted with the care of the plantation.

After every second plant is taken away, let the roots be grubbed up, not only because they will pay for grubbing as fire-wood, but that there may be more room given for the standing plants freely to extend their roots.

The plants being now four feet asunder each way, they will require no more thinning for seven or eight years, when the healthiest and best thriving trees must be marked to stand for timber, and the others cut down for poles, and their roots left to produce future under-wood.

In this manner the rows filled with plants from the nursery must be managed, in which case we can speak with precision with regard to thinning. The same clearness of husbandry must be applied to the rows under cultivation from the seed, but the planter in this last method must be left to form his own ideas in respect to thinning, as no human knowledge can determine, before hand, how thick the seedling plants will appear in the rows. In rocky and mountainous soils, the plants or acorns must be put down irregularly by the spade, and the planter must be directed in this operation by the particular circumstances of the soil and situation.

In all cases of planting, shelter and warmth are particularly required. Where the plantations are flat, it may be advisable to skirt the wood with Scotch Fir, which, being a hardy and quick growing tree, is well calculated for this purpose.

Birch is sometimes put between the rows of Oaks, and in mountainous situations this is a good method; others recommend the Fir for this purpose, but it is apt to vegetate too fast and over-top the Oaks.

I shall now consider our plantation as far advanced, in which case a particular attention should be paid to the trees planted for timber. These should stand from twenty to thirty feet distant from each other, which will not be too near where the

and the white one of Virginia, a most stately tree, which (bearing acorns) might easily be propagated here if it were worth the while. CHAP. III.

3. I shall not need to repeat what has already been said, chap. ii. concerning the raising of this tree from the Acorn; it will also endure the laying, but never to advantage of bulk or stature. It is in the mean time

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trees thrive well; in which case their heads will spread, so as to meet in about thirty or thirty-five years; nor will this distance be so great as to impede the upright growth of the trees. This distance is recommended, that the trees may enjoy the whole benefit of the soil; therefore, after one crop of the under-wood, or at the most two crops are cut, I would advise the stubbing up the stools, that the ground may be entirely clear for the advantage of the growing timber, which is what should be principally regarded; but, in general, most people attend more to the immediate profit of the under-wood than the future good of the timber, and frequently by so doing spoil both; for if the under-wood be left after the trees have spread so far as that their heads meet, the under-wood will not be of much worth; and yet, by their stools being left, they will draw away a great share of nourishment from the timber-trees, and retard them in their growth.

Such Gentlemen as are desirous of raising Oaks to plant out for standards, either in parks or in fields, for clumps, or for avenues, must train them in the following manner: Having raised them in the seed-bed, as was before directed for woods, let them remain there two years; after which a piece of good ground must be prepared for their reception, where they must grow until they are of a size sufficient to be planted out where they are designed to remain. This ground must be trenched, or double dug; then, taking the plants out of the seed-bed, as before directed, let a man and boy plant them upon this new double-dug ground, at the distance of two feet row from row, and a foot and half asunder in the rows. Every winter, until the plants are taken out of this nursery, the ground should be dug between the rows; and this is what gardeners call *turning-in*. They will require no other pruning than taking off any unightly side shoot; or, where the tree is inclined to be forked, taking off the weakest branch. Nor is any other precaution necessary, until the time of their being planted out to continue, which must be done as follows:

First, carefully take the trees out of the nursery, and then prune the roots, which must be done by holding the plant in your left hand, that the stroke of the knife in the right may so cut the bottom of the root that the wound may be downwards; next, take off all bruised and broken parts of the root; and having holes prepared, in the figure of a circle, three feet in diameter and a foot and half deep, (the sward being worked and chopped small in the bottom of the holes, and some mould laid to cover it) plant the trees in such a manner that the top of the roots may be nearly level with the surface of the ground. Let the finest of the mould which was under the turf

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the propagation of these large spreading Oaks, which is especially recommended for the excellency of the timber, and that his Majesty's forests were well and plentifully stored with them, because they require room and space to amplify and expand themselves, and should therefore be planted at more remote distances, and free from all incumbrances: And this upon consideration, how slowly a full-grown Oak mounts upwards, and how

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be preserved to lap the root in; and, after the earth has regularly filled the hole, let it be pressed down with the foot, to settle it properly to the root. A little litter should be laid over the root, to prevent the wind and sun from drying the mould; and thereby retarding the growth of the tree, especially if the planting be deferred till the spring. These plants, being of a larger size, should be properly staked to secure them from the violence of the winds; or, if they are planted where cattle or deer can come, they should be properly hurdled. After this, they will require no farther care.

Oaks will not aspire to such height, or fineness of trunk, when planted in these places, as in woods; but they will form most beautiful heads, and their shade will be extensive and large. Mr. Maſon, in his dramatic Poem called *Caractacus*, gives a beautiful description of such trees.

Behold yon Oak,

How stern he frowns, and with his broad brown arms

Chills the pale plain beneath him.

The Oak will grow and thrive upon almost any soil, provided the trees be properly planted, though we cannot suppose that their growth will be equal in all the sorts: A rich deep loamy earth is what Oaks most delight in, and in such they will arrive at the greatest magnitude in the fewest years; tho' they grow exceedingly well in clays of all kinds and on sandy soils, in which last the finest-grained timber is produced. Many fine trees of this texture may now be seen growing upon Nottingham forest, particularly at Welbeck.

Having thus given a minute detail of the different methods of raising an Oak wood from the *Acorn*, the *Seed-bed*, and the *Nursery*, we are now arrived at a very important and interesting question: Which makes the best Timber? Mr. Evelyn decides for fowing; and if a careful observer will look into the woods that have been sown, and at the same time examine such as have been planted, he will not hesitate a moment to declare in favour of the excellent Author of this Treatise. The extensive plantations that have been carried on for these many years past, have been made more with a view to Shade, Shelter, and Ornament, than to the propagation of Timber; and, in order to obtain these ends in the most expeditious manner, the owners have in general followed a mistaken notion, and planted their trees too old; so that many of these woods, when they come to be felled, will greatly disappoint the expectations of the purchasers. Besides, such advanced trees when drawn from the nursery, unless planted in a good soil, will never come to timber. On the contrary, rocky and poor soils may be made to

speedily it spreads and dilates itself to all quarters, by dressing and due culture, so as above forty years advance is to be gained by this only industry: And if thus his Majesty's forests and chases were stored, viz. with this spreading tree at handsome intervals, by which grazing might be improved for the feeding of deer and cattle under them (for such was the old

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produce excellent timber by judiciously sowing the seeds, and carefully defending the young plants from the browsing of sheep and cattle, or the cropping of hares and rabbits. By this practice, the plants are attached to their native earth, and are strangers to the inconveniences that trees drawn from a nursery are exposed to.

In Scotland, and in some of the northern counties of this kingdom, the practice of sowing their waste lands with acorns, chesnuts, beech-mast, fir-seeds, ash-keys, &c. is much recommended, and there is not the least doubt but that Posterity will enjoy the benefits arising from this judicious practice. The expence attending the sowing an acre of waste land with various seeds of forest-trees, is trifling when compared with that of planting; and if all other things were equal, that alone would be decisive. Charles Turner, Esq; of Kirkleatham, in the county of York, has within these few years sown upwards of 400 acres of waste and moor land with the various seeds of forest-trees, and I am credibly informed that he intends to sow 100 acres annually, for a series of years; so that should his example be followed, and there is no doubt but it will, in consequence of his present success, we shall in half a century see our rocky, moor, and barren lands covered with wood to the advantage of the rising generation. In the neighbourhood of coal and lead mines, and iron forges, such woods will become highly profitable at an early period; and considering the great demand that is constantly made from such places for all kinds of wood, it is matter of surprize that the cheap method of raising woods from seeds and seedling plants, has been so long neglected. As example is always better than precept, I beg leave to recommend a view of Mr. Turner's estate at Kildale, to such Gentlemen as wish to bring their weak, rocky, and moor lands into the most profitable cultivation. The following method was there practised.

The men being divided into parties, each consisting of three men, the first man with a paring spade took up a turf in the usual manner. The second man stirred the earth with a spade, and the third distributed the acorns, chesnuts, fir-seeds, &c. and afterwards covered them. Where the soil was shallow, or gravelly, the second man chopped the turf down to the gravel, or rock, after which the third man introduced the seeds, and closed the earth. In some places, seedling firs, larches, and oaks were put down in the place of seeds, which, from their *youth*, were soon reconciled to their change of situation; and this practice was highly judicious,

Mutatam ignorent subito ne femina matrem.

VIRG.

Had they been plants of three or four years growth, it is more than probable that by far the greater number would have died. It fared otherwise with the infant plants. By attending to the above regular mode of sowing, and seedling-planting, an exten-

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Saltus) benignly visited with the gleams of the sun, and adorned with the distant landscapes, appearing through the glades and frequent vallies, nothing could be more ravishing. We might also sprinkle fruit-trees amongst them for cyder, and many singular uses, and should find such goodly plantations the boast of our rangers, and forests infinitely preferable to

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five tract of country may be covered with wood in a few years, at a moderate expence. The work, when conducted in this manner, should be performed very early in the spring; but in such lands as are apt to swell after frosts, it will be best to remove the turf, and stir the soil in the autumn previous to sowing, whereby the earth will become more solid, and the infant plants be less liable to be thrown out in winter. And here it will be necessary to give another caution of some moment to the planter. Moor earth consisting of loose and uncorrupted vegetable fibres, becomes soon dry after planting, so that the nick made for the reception of a seedling plant frequently opens and exposes the root to the action of the sun. In such places the soil should be well stirred, and the plants put down very early in the spring, taking care to fix the earth as close to the roots as possible.

In some parts of Scotland, the seedling firs are put into the earth without any sort of preparation. A hole being bored through the heath with an iron instrument, made in the form of a large gimblet, the seedling is immediately introduced. By this management the soil is prevented from opening in hot weather to the prejudice of the young plant. Instead of being pointed, the instrument is flattened at the extremity, like a chisel with a nick in it, by which the plant is drawn down to the bottom of the hole made to receive it. But of this I shall probably have occasion to speak more fully in the chapter upon firs.

I have already remarked, that under every circumstance of sowing or planting, especially the former, the utmost care must be taken to fence off the young plants, lest cattle and sheep should break in and render the pains of the planter abortive.

Texendæ sepes etiã, et pecus omne tenendum est:

Præcipue dum frons tenera imprudensque laborum:

Cui super indignas hyemes, solemque potentem,

Sylvestres uri affidû capræque sequaces

Illidunt: Pascuntur oves, avidæque juvencæ.

Frigora nec tantum canã concreta pruina

Aut gravis incumbens scopulis arentibus æstas;

Quantum illi nocuere greges, durique venenum

Dentis, et admorso signata in stirpe cicatrix.

VIRG.

As ferns, and grasses of every kind, are great enemies to plants raised from seeds, the utmost care must be taken to keep the woods, during their infancy, as clear from them as possible. Tall fern will sometimes twine about sown oaks of two feet high, and bend them to the ground, to the utter destruction of the wood, unless properly noticed. However, in poor land the fern is seldom possessed of such a destructive

any thing we have yet beheld, rude and neglected as they are. I say, when his Majesty shall proceed, as he hath designed, to animate this laudable pride into fashion, forests and woods, as well as fields and inclosures, will present us with another face than now they do. And here I cannot but applaud the worthy industry of old Sir Harbottle Grimstone, who, I am told, from a very small Nursery of Acorns, which he sowed in the neglected corners of his ground, did draw forth such numbers of Oaks of

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luxuriancy. The expence of fencing and keeping the land clear from grass and weeds will be abundantly repaid in the increase and vigour of the wood, and should upon no account be dispensed with.

Under some particular circumstances, it may be proper to cover rocky and exposed situations with Oaks raised in a nursery. In such cases we should always plant from the seed-bed; and in order to bring up the young Oaks, where the aspect and situation happen to be unfriendly, it should be recommended to skirt the wood, to a sufficient thickness, with Scotch firs; mixing some of them in the body of the wood. In this manner an exposed situation may be made to produce excellent timber; and when the trees are grown to a size sufficient for their own protection, the firs in the centre, which I call the nurseries, should be removed, otherwise they will injure the young Oaks.

————— Foster'd thus,

The cradled hero gains from female care.

His future vigor; but, that vigor felt,

He springs indignant from his nurse's arms,

He nods the plumed crest, he shakes the spear,

And is that awful thing which heav'n ordain'd

The scourge of tyrants, and his country's pride. MASON.

On the judicious thinning and cleaning a young wood, depends much of the planter's success and profit; on which account all gentlemen who engage deeply in planting will find it highly necessary to appoint proper persons, whose office shall be solely confined to the superintendence of the woods. From a neglect in this particular, the hopes of half a century may be thrown away in a period of a few years.

The method of seedling-planting comes nearest to the nature of sowing, and is generally connected with it in all large undertakings; but I must refer the reader to the notes upon the different forest-trees in the course of this work, where the judicious practice of planting from the seed-bed is occasionally recommended.

It often happens, from natural or accidental causes, that planted Oaks grow stunted and crooked; in such cases they should be cut down at a proper season. In consequence of this judicious practice, a clean leading shoot will be obtained that will soon overtake the cotemporary trees that have not undergone the same operation. But it must be considered that no Oak should be thus headed down till two or three years after planting, or until it has completely rooted itself in the ground. Many other kinds of Forest-trees, under similar circumstances, may be treated in the same manner;

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competent growth, as being planted about his fields in even and uniform rows, about one hundred feet from the hedges, bushed and well watered till they had sufficiently fixed themselves, did wonderfully improve both the beauty and the value of his demesnes. But I proceed.

4. Both these kinds should be taken up very young, and transplanted about October; some yet for these hardy and late springing trees, defer it

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but we must except all the Pine tribe from this operation, as in them the loss of the leading shoot is the certain loss of the tree.

An opinion generally prevails, that good land should always be employed in Meadow, Pasture, and Tillage, and that none but the barren and rocky soils should be planted. Such an idea is by no means founded on truth, as it may be demonstrated, that good land lying remote from a town, and near a navigable river or canal, will yield a better profit when planted, than if it had been employed in pasturage and tillage. There is, I confess, some difference, when we consider that in the one case the profits are annual and small, and in the other distant and large, which circumstance must materially affect the inclinations of some people; but a true patriot, and all planters are patriots, will forego the present profits, and rest satisfied with having handed down to posterity a blessing of inestimable value. Full of this idea, the patriot will set apart some good lands for the generous purpose of raising timber, which at some future periods may be employed in building ships for the advancement of our commerce and the security of our island.

Let India boast her plants, nor envy we
The weeping amber and the balmy tree,
While by our Oaks the precious loads are born,
And realms commanded which those trees adorn.

POPE.

As a farther encouragement to the generous planter, it may be remarked that the best lands always produce the cleanest, quickest, and best growing timber; at the same time, the under-wood springs up with an amazing and profitable luxuriance. To such men the soil is always grateful.

When a large tract of land is designed for wood, especially if it be of an indifferent quality, it may be advantageous to attend to the following method, which was recommended to me by a gentleman long conversant in the practice of raising woods. But it must be observed, that this method can only be complied with in places where the plow can be introduced.

Plow the whole in October or November, and in the following spring plow and harrow so as effectually to destroy the turf. The land being reduced to an excellent tilth, sow it with turnip-seed about the third week in June, and when the plants are sufficiently advanced let them be carefully hoed, which operation must be repeated at a proper interval. After this the crop, if possible, should be eaten upon the ground with sheep. Upon the same land another crop of turnips should be taken the succeed-

till the winter be well over, but the earth had need be moist; and though they will grow tolerably in moist grounds, yet do they generally affect the found, black, deep, and fast mould, rather warm than over wet and cold, and a little rising, for this produces the firmest timber; though my Lord Bacon prefers that which grows in the moister grounds for ship-timber, as

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ing year; after which the ground will be in clean and excellent condition for receiving the acorns and seeds of Forest-trees. These should be committed to the earth in the following manner:

Early in the spring, upon one plowing, sow one bushel, or three pecks, of oats, and at the same time sow the necessary quantity of acorns, chestnuts, ash-keys, beech-mast, fir-seeds, &c. After this, let the whole be harrowed to cover the seeds. As in all extensive tracts there are a variety of soils, it will be most judicious to sow the different seeds upon such parts as are most suitable to their respective natures. Besides, some trees, though they delight in the same sort of soil, do not grow kindly together; so that the planter will do well to consider this, and only mix such together as are found, by general practice, to grow friendly to each other. And here I beg leave to remark, that where the turnips are cultivated in drills and well horse-hoed, the land will be in better condition for receiving the acorns, &c. than if the broad-cast method had been pursued.

In this manner an extensive wood may be raised at a small expence, as the turnip and oat crops will pay the expence of plowing, rent, and incidental charges. The tender plants being nourished, warmed, and protected by the oat stalks, will make vigorous shoots, and, having no weeds to struggle with the first summer, will push forward with amazing vigour. As the land sown in this manner will be fully stocked with plants, the feet of the reapers employed in cutting down the oats will not materially affect the seedling Oaks, which before the autumn will have made a considerable progress. The Firs, from the slowness of their growth, will be secure from injury, and the Ashes cannot be hurt, as they do not vegetate till the second year. In some parts of Norfolk, where the land, in general, is of a sandy nature, with a bed of clay or marl underneath, it is recommended by the author of the above instructions, to raise an Oak wood by sowing the acorns with a crop of spring rye; and I am well informed of the success of that method in one instance.—A wood raised in this natural manner will not only make the best timber for the uses of the carpenter and ship-builder, but will arrive at maturity many years sooner than one of the same age raised from plants drawn from the nursery. The tap-root of all trees corresponds with the leading shoot; so that when it is cut off, as in planting from the nursery, the tree is weakened in its leading shoot, but puts out more vigorously in its lateral ones. An attention to the correspondence between the branches and roots solves many of the phenomena in pruning and planting.

A wood raised in this cheap and easy manner may be thinned at proper seasons, leaving the most thriving trees to stand for timber, or (which is the most profitable way)

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the most tough, and less subject to rift. But let us hear Pliny: "This is a general rule", saith he, "what trees soever they be which grow tolerably, either on hills or vallies, arise to greater stature, and spread more amply in the lower ground; but the timber is far better, and of a finer grain, which grows upon the mountains, excepting only Apple and

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it may be converted into a spring wood, in which case no timber should be left standing, as the copse wood will be retarded in its growth by the over-dripping of the large trees. According to the goodness of the land, the spring wood will arrive sooner or later at maturity; and as wood of that kind is a regular and constant income, after a term of years, it becomes a very advantageous method of applying land in all countries where fuel is dear.

As much depends upon keeping the seedling plants clear from weeds, it might be an improvement to the plan, if, after the oats are harrowed in, drills were drawn with a light plow all over the field at the distance of four feet from each other. Into these let the acorns, chefnuts, and other seeds be sown, after which they may be covered with rakes; the thickness, however, of the covering, and the deepness of the drills, must be regulated by the nature of the soil and the seed sown. A wood raised in this manner may be cleaned at a small expence by horse-hoeing the intervals, and hand-hoeing and thinning the rows at proper seasons; for which necessary operations consult the directions already given for cleaning Oaks drawn from the nursery, and planted in rows.

The celebrated Marquis of Turbilly, speaking of woods raised from seeds, says, "Woods thus raised out-grow, even in a few years, those that have been planted at the same time, and cultivated by digging and dressing at a great expence. No trees are taller, straighter, and of a finer bark."

In this place I judge it necessary to remark, that the above directions are drawn from the most approved authors, as well as the private information of Gentlemen well conversant in the practice of planting; but as all countries differ in a variety of circumstances, I wish to be understood as only laying down rules subject to a necessary variation. There is nothing so dangerous in planting as obeying too servilely the directions given in books: something must be left to the planter himself.

I have a particular satisfaction in laying before my readers the following letter, written by Mr. Speechly, gardener to his Grace the Duke of Portland, describing the method of forming plantations upon the Duke's estate in the county of Nottingham. It is a valuable piece of practical information, and merits our utmost attention.

"Few Noblemen plant more than his Grace the Duke of Portland; and I think I may say, without vanity, none with greater success. But as no man should think of planting in the very extensive manner that we do, before he is provided with well-stocked nurseries, it may not be amiss, before I proceed further, to give a short sketch of that necessary business, as also to inform you of

Pear trees." And in cap. xxxix. lib. xvi. "The timber of those trees which grow in moist and shady places is not so good as that which comes from a more exposed situation, nor is it so close, substantial, and durable." Upon which he much prefers the timber growing in Tuscany, before that towards the Venetian side, and upper part of the Gulph. And that timber so grown was in greatest esteem long before Pliny, we have the spear of Agamemnon *ἔχων ἀνεμοτρεπὲς ἔσχατον*. *Il. λ.* formed from a tree so exposed; and Didymus gives the reason, *Τὰ γὰρ ἐν ἀνέμῳ πλέον γυμναζόμενα δένδρα στερεὰ, &c.* "For that being continually weather-beaten, they become hardier and tougher: Otherwise, that which is wind-shaken never

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"the soil and situation of our seat of planting. The greatest part of our plantations is on that soil, which in Nottinghamshire is generally distinguished by the name of Forest-land. It is a continuation of hills and dales; in some places the hills are very steep and high; but in general the ascents are gentle and easy.

"The soil is composed of a mixture of sand and gravel; the hills abound most with the latter, and the vallies with the former, as the smaller particles are by the wind and rains brought, from time to time, from the high grounds to the lower. It is on the hilly grounds we make our plantations, which in time will make the vallies of much greater value, on account of the shelter they will afford.

"After his Grace has fixed on such a part of this Forest-land as he intends to have planted, some well-situated valley is chosen (as near the center of the intended plantations as may be) for the purpose of a nursery; if this valley is surrounded with hills on all sides but the south, so much the better. After having allotted a piece of ground, consisting of as many acres as is convenient for the purpose, it is fenced about in such a manner as to keep out all obnoxious animals. At either end of the nursery are large boarded gates, as also a walk down the middle, wide enough to admit carriages to go through, which we find exceedingly convenient when we remove the young trees from thence to the plantations. After the fence is completed, the whole is trenched (except the walk in the middle) about twenty inches deep, which work may be done for about three pounds ten shillings, or four pounds, per acre, according as the land is more or less gravelly; this work is best done in the spring when the planting season is over. If after the trenching, two or three chaldrons of lime be laid on an acre, the land will produce an excellent crop either of cabbages or turnips, which being eaten off by sheep in the autumn, will make the land in fine order for all sorts of tree-seeds: But as the Oak is the sort of tree we cultivate in general, I shall confine myself particularly to our present method of raising and managing that most valuable species. In the autumn after the cabbage or turnips are eaten off, the ground will require nothing more than a common digging. So soon as the acorns fall, after being provided with a good quantity, we sow them in the following manner: Draw drills with a hoe in the same manner as is practised for pease, and sow the acorns therein so thick as nearly to touch each other,

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comes to good; and therefore when we speak of the climate, it is to be understood of vallies rather than hills, and in calm places, than exposed, because they shoot straight and upright. The result of all is, that upon occasion of special timber, there is a very great and considerable difference; so as some oaken timber proves manifestly weaker, more spongy, and sooner decaying than other. The like may be affirmed of Ash, and other kinds; and, generally speaking, the close-grained is the stoutest and most permanent: But of this let the industrious consult that whole tenth chapter in the second Book of Vitruvius, where he expressly treats of this argument, *de abiete supernate & infernate, cum Appennini descriptione*:

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“ and leave the space of one foot between row and row, and between every fifth row
 “ leave the space of two feet for the alleys. While the acorns are in the ground great
 “ care must be taken to keep them from vermin, which would very often make great
 “ havock amongst the beds, if not timely prevented. Let this caution serve for most
 “ other sorts of tree-seeds.

“ After the acorns are come up, the beds will require only to be kept clean from
 “ weeds till they want thinning; and as the plants frequently grow more in one wet
 “ season, where the soil is tolerably good, than in two dry ones, where the soil is but
 “ indifferent, the time for doing this is best ascertained by observing when the tops of
 “ the rows meet. Our rule is to thin them then, which we do by taking away one
 “ row on each side the middlemost, which leaves the remaining three rows the same
 “ distance apart as the breadth of the alleys. In taking up these rows we ought to
 “ be anxiously careful neither to injure the roots of the plants removed, nor of those
 “ left on each side. The rest of the young Oaks being now left in rows at two feet
 “ apart, we let them again stand till their tops meet; then take up every other row,
 “ and leave the rest in rows four feet asunder, till they arrive to the height of about
 “ five feet, which is full as large a size as we ever wish to plant. In taking up the
 “ two last sizes, our method is to dig a trench at the end of each row full two feet
 “ deep, then undermine the plants, and let them fall into the trench with their roots
 “ intire.

“ And here let me observe, that much, very much, of their future success depends
 “ on this point of their being well taken up. I declare that I should form greater
 “ hopes from one hundred plants well taken up and planted, than from ten times that
 “ number taken up and planted in a random manner; besides, the loss of the plants
 “ makes the worst method the most expensive.

“ But before I leave this account of our method of raising Oaks, I shall just beg
 “ leave to observe, that we are not very particular in the choice of acorns; in my own
 “ opinion it matters not from what sort of tree the acorns are gathered, provided they
 “ are good; for although there seems to be a variety of the English Oak, in respect
 “ to the form of the leaf and fruit, also their coming into leaf at different seasons,
 “ with some other marks of distinction, yet I am of an opinion that they will all

where we note concerning Oak, that it neither prospers in very hot nor excessive cold countries; and therefore there is little good of it to be found in Africa, or, indeed, the lower and most southern parts of Italy, (but the Venetians have excellent timber) nor in Denmark or Norway, comparable to ours, it chiefly affecting a temperate climate; and where it grows naturally in abundance, it is a promising mark of it. If I were

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“ make good timber-trees if properly managed: It is natural to suppose that a tree
 “ will grow low and spreading in a hedge-row; on the contrary, it is very improbable
 “ that many should grow so in a thick wood, where, in general, they draw one another up straight and tall. And I have observed that the same distinctions hold
 “ good amongst our large timber-trees in the woods, as in the low-spreading Oaks in
 “ the hedge-rows.

“ Tho’ I have not as yet taken notice of any other sort of tree but the Oak, yet we
 “ have a great regard for, and raise great quantities of Beech, Larch, Spanish Chestnut,
 “ Weymouth Pine, and all sorts of Firs, the Scotch excepted, as well as many other
 “ kinds, by way of thickening the plantations while young; amongst which the Birch
 “ has hitherto been in the greatest estimation, it being a quick-growing tree, and taking
 “ the lead of most other sorts on our poor forest hills; and as we have an inexhaustible
 “ spring of them in the woods, where they rise of themselves in abundance
 “ from seed, we at all times plant them plentifully of different sizes. As to the Elm
 “ and Ash, we plant but few of them on the Forest; though we raise great quantities
 “ of both, but particularly the Ash, which being an useful wood (but a bad neighbour
 “ amongst the Oaks) we plant in places apart by itself. I shall dismiss this subject
 “ concerning the management of our nurseries, after saying a word or two relating to
 “ pruning: We go over the whole of the young trees in the nursery every winter;
 “ but in this we do little more than shorten the strong side-shoots, and take off one
 “ of all such as have double leads.

“ Having thus pointed out the mode of forming and managing our nurseries, I shall
 now proceed to the plantations. The size of the plantations, at first beginning, must
 “ be in proportion to the stock of young trees in the nursery; for to undertake to
 “ plant more ground than we have young trees to go through with for thick plantations,
 “ would turn to poor account on our Forest hills. We always plant thick, as
 “ well as sow plentifully at the same time, provided it be a season in which acorns
 “ can be had; so that all our plantations answer in a few years as nurseries to succeeding
 “ plantations.

“ As to the form of the plantations they are very irregular; we sometimes follow
 “ a chain of hills to a very great distance; so that what we plant in one season, which
 “ perhaps is sixty, eighty, and sometimes an hundred acres, is no more than a part of
 “ one great design.

“ If the ground intended to be planted has not already been got into order for that
 “ purpose, it should be fenced about at least a twelvemonth before it is wanted to

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to make choice of the place, or the tree, it should be such as grow in the best cow-pasture, or up-land meadow, where the mould is rich and sweet, (Suffolk affords an admirable instance) and in such places you may also transplant large trees with extraordinary success: And therefore it were not amiss to bore and search the ground where you intend to plant or sow, before you fall to work, since earth too shallow or rocky is not so proper for this timber; the roots fix not kindly, and though for a time they may seem to flourish, yet they will dwindle. In the mean time, it is wonderful to consider how strangely the Oak will penetrate to

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“ plant on, and immediately got into order for a crop of turnips; two chaldrons of
 “ lime being laid on an acre will be of great service, as it will not only be a means of
 “ procuring a better crop of turnips, but will bind the land afterwards, and make it
 “ fall heavy, which is of great use when it comes to be planted, as some of the Forest
 “ land is so exceedingly light as to be liable to be blown from the roots of the young
 “ trees after planting: Therefore we find it to be in the best order for planting about
 “ two years after it has been plowed up from pasture, before the turf is too far gone to
 “ a state of decay. It will be necessary to have a part of the turnips eaten off soon
 “ in the autumn, in order to get the ground into readiness for early planting; for we
 “ find the forward planting generally succeeds the best.

“ After the turnips are eaten off, we plow the ground with a double-furrow
 “ trenching plow made for that purpose, which, drawn by six horses, turns up the
 “ ground completely to the depth of twelve or thirteen inches: This deep plowing is
 “ of great service to the plants at the first, and also saves a great deal of trouble in
 “ making the holes. After the plowing is finished, we divide the ground into quarters
 “ for the planting by ridings. It will be a difficult matter to describe the laying out
 “ the ground for this purpose, especially where there is such a variety of land as we have
 “ on the Forest; much depends on the taste of the person employed in this office.
 “ Between the hills, towards the outfides of the plantations, we frequently leave the
 “ ridings from sixty to an hundred yards in breadth, and contract them towards the
 “ middle of the woods, to the breadth of ten or twelve yards; and on the tops of the
 “ hills where there are plains, we frequently leave lawns of an acre or two, which
 “ makes a pleasing variety.

“ In some of them we plant the Cedar of Libanus at good distances, so as to form
 “ irregular groves; and this sort of tree seems to thrive to admiration on the Forest-
 “ land. On the outfides of the woods, next to the ridings, we plant Evergreens, as
 “ Hollies, Laurels, Yews, Junipers, &c. and these we dispose of in patches, sometimes
 “ the several sorts entire, at other times we intermix them for variety; but not so as
 “ to make a regular screen or edging. Our design in the distribution of these plants,
 “ is to make the outfides of the woods appear as if scalloped with Evergreens inter-

come to a marly bottom; so as where we find this tree to prosper, the indication of a fruitful and excellent soil is certain, even by the token of this natural Augury only; so as by the plantation of this tree and some others, we have the advantage of profit raised from the pregnancy, substance, and depth of our land; whilst by the grass and corn (whose roots are but a few inches deep) we have the benefit of the crust only.

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“mixed sometimes with rare trees, as the *Liriodendron Tulipifera*, or Virginian Tulip-tree, &c.

“After the ground is laid out into quarters for planting, we assign certain parts to Beech, Larch, Spanish Chestnuts, &c. These we plant in irregular patches here and there, throughout the plantations, which, when the trees are in leaf, has the most pleasing effect, on account of the diversity of shades; especially in such parts of the Forest where four, five, and sometimes more of the large hill-points meet in the same valley, and tend, as it were, to the same center.

“After those patches are planted, or marked out for that purpose, we then proceed to the planting in general. We always begin with planting the largest young trees of every sort, and end our work with those of the smallest size; were we to proceed otherwise, the making a hole for a larger-sized tree, after the small ones are thick planted, would cause the greatest confusion.

“Birch is generally the sort of tree we make our beginning with, which we find will bear to be removed with great safety, at the height of six or seven feet, though we commonly plant rather under than at that size. This sort of tree we are always supplied with from our plantations of five or six years growth. But before I proceed to the taking them up, it will be proper to inform you, that in the planting season we divide our hands into four classes, which we term Takers-up, Pruners, Carriers, and Planters: And here I shall describe the several methods of doing this work.

“First, in taking up, we have the same care to take up with good roots in the plantations, as was recommended in the nursery, though we cannot pursue the same method; but in both places, so soon as the plants are taken up we bed them in the ground in the following manner: Dig a trench at least fifteen inches deep, and set the young trees therein with their tops aslant, covering their roots well as we go along, and almost half way up the stem of the plants, with the earth that comes out of a second trench, which we fill in the like manner, and so proceed on till we have a load more or less in a heap, as may be convenient to the place from whence they were taken. In our light soil this trouble is but little, and we always have our plants secure, both from their roots drying, and their suffering by frost. We have a low-wheeled waggon to carry them from the heaps, where they are bedded, to the pruners, and generally take two loads every other day. When they arrive, the planters, pruners, &c. all assist to bed them there, in the same manner as before described. We have a portable shed for the pruners to work under, which is also

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5. But, to discourage none, Oaks prosper exceedingly even in gravel, and moist clays, which most other trees abhor; yea, even the coldest clay grounds that will hardly graze: But these trees will frequently make stands, as they encounter variety of footing, and sometimes proceed again vigorously, as they either penetrate beyond, or out-grow their obstructions, and meet better earth; which is of that consequence, that I dare boldly affirm, more than an hundred years advance is clearly gained by soil and husbandry. I have yet read, that there grow Oaks (some of

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“ convenient for the rest of the work people to take shelter under in stormy weather.
 “ From the above heaps the plants are taken only so fast as they are wanted for
 “ pruning, which work we thus perform: Cut off all the branches close to the stem
 “ to about half the height of the plant, shortening the rest of the top to a conical
 “ form in proportion to the size of the plant; and in pruning of the roots, we only cut
 “ off the extreme parts that have been bruised by the taking up, or such as have been
 “ damaged by accident, wishing at all times to plant with as much root as can be had.
 “ As soon as they are pruned they are taken to the planters, by the carriers, who
 “ are generally a set of boys, with some of the worst of the labourers. The planters
 “ go in pairs; one makes the holes, and the other sets and treads the plants fast, which
 “ work they commonly do by turns. In making of the holes we always take care to
 “ throw out all the bad soil that comes from the bottom; if the planting be on the
 “ side of a hill, we lay the bad soil on the lower side of the hole, so as to form a kind
 “ of basin; for without this care our plants would lose the advantage of such rains as
 “ fall hastily. We at all times make the holes sufficiently large, which is done with
 “ great ease after our deep plowing.

“ Before we set the plant, we throw a few spadefuls of the top soil into the hole,
 “ setting the plant thereon with its top rather inclining to the west; then fill up the
 “ hole with the best top soil, taking care that it closes well with the roots, leaving no
 “ part hollow. When the hole is well filled up, one of the planters treads and fastens
 “ the tree firmly with his feet, while his partner proceeds to make the next hole.

“ The fastening a tree well is a material article in planting; for if it once becomes
 “ loose, the continual motion which the wind occasions, is sure to destroy the fibres as
 “ fast as they are produced, which must end in the destruction of the plant, if not
 “ prevented. It is to guard against this inconveniency that we take off so much of
 “ the top, as has been described in the article of pruning.

“ We plant about three or four hundred Birches of the large size on an acre, and
 “ nearly the same number of the first-sized Oaks; we also plant here and there a
 “ Beech, Larch, Spanish Chesnut, &c. exclusive of the patches of the said sorts of
 “ trees before planted. We then proceed to plant plentifully of the second and lesser-
 “ sized Oaks; and last of all a great number of the small Birches, which are procured
 “ from the woods at about three shillings or three shillings and sixpence per thousand:

which have contained ten loads apiece) out of the very walls of Silchester in Hampshire, which seem to strike root in the very stones; and even in our renowned forest of Dean itself, some goodly Oaks have been noted to grow upon ground, which has been as it were a rock of antient cinders, buried there many ages since. It is indeed observed, that Oaks which grow in rough stony grounds, and obstinate clays, are long before they come to any considerable stature, (for such places, and all sorts of clay, is held but a step-mother to trees) but in time they afford the most

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“ These we remove to the succeeding plantations after the term of five or six years.
 “ Of the several sizes of the different kinds of trees we generally plant upwards of
 “ two thousand plants upon an acre of land, all in an irregular manner.

“ After the planting is finished we then sow the acorns (provided it be a season that
 “ they can be had) all over the plantation, except amongst the Beech, Larch, &c. in
 “ the aforesaid patches. Great care should be taken to preserve the acorns intended
 “ for this purpose, as they are very subject to sprout, especially soon after gathering;
 “ the best method is to lay them thin in a dry airy place, and give them frequent
 “ turnings. We sow these acorns in short drills of about a foot in length, which
 “ work is done very readily by two men, one with the acorns, the other with a hoe
 “ for the purpose of making the drills and covering the seed.

“ We are of opinion that the plants produced from these acorns will at last make
 “ the best trees; however, I will not pretend to say how that may be, as the Oaks
 “ transplanted small, grow equally well for a number of years: But it is probable that
 “ a tree with its tap-root undisturbed may, in the end, grow to a much larger size.

“ After the whole is finished to a convenient distance round the pruners, we then
 “ remove their shed to a second station, and there proceed in the like manner; and so
 “ on till the whole be finished.

“ It would be well to get the planting done by the end of February, especially for
 “ trees of the deciduous kind; but from the disappointments we meet with, occasioned
 “ by the weather, we are sometimes detained to a later season.

“ I have several times made trial of twelve or fourteen kinds of American Oaks sent
 “ over to his Grace in great quantities. I sowed them in the nursery, and also in the
 “ best and most sheltered parts of the plantations. In both places they come up very
 “ plentifully; but I now find that several of the sorts will not stand the severity of our
 “ winters, and those that do make so small a progress as to promise no other encourage-
 “ ment than to be kept as curiosities.

“ Towards the end of April, when the ground is moist, it will be of great service
 “ to go over the whole plantations, and fasten all such trees as are become loose since
 “ their planting: After this, nothing more will be required till the month of June,
 “ when we again go over the whole with hoes, cutting off only the tall-growing weeds;
 “ for the sooner the ground gets covered with grass, in our light soil, so much the better.

“ I own there is something slovenly in the appearance of this method, and on some
 “ lands I would recommend keeping the ground clean hoed for some time at first,

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excellent timber, having stood long, and got good footing. The same may we affirm of the lightest sand, which produces a smoother-grained timber, of all other the most useful for the joiner; but that which grows in gravel is subject to be frow, as they term it, and brittle. What improvement

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“ as also planting in rows, which in that case would be necessary. More than once I
 “ have tried this method on our Forest-hills, and always found, after every hoeing, that
 “ the soil was taken away by the succeeding winds into the valleys.

“ Besides this inconvenience, the reflection of our sandy soil is so very great, that
 “ we find the plants stand a dry season much better in our present method, than in the
 “ former: And whoever fancies that grass will choke and destroy seedling Oaks, will,
 “ after a few years trial, find himself agreeably mistaken: I have even recommend-
 “ ed the sowing the poorer parts of the hills with furze or whin-seed, as soon as they
 “ are planted: We have sometimes permitted the furze to grow in the plantations by
 “ way of shelter for the game, which though it seems to choke and over-grow the
 “ Oaks for some time, yet after a few years we commonly find the best plants in the
 “ strongest beds of whins. This shews how acceptable shelter is to the Oak whilst
 “ young; and experience shews us that the Oak would make but a slow progress on
 “ the Forest-hills for a number of years at the first, were it not for some kind nurser;
 “ and the Birch seems to answer that purpose the best, as I have already observed.

“ The several sorts of Fir-trees, from appearance, seem to promise a greater shelter;
 “ but on the Forest-land they do not grow so fast as the former, and what is worse,
 “ the Oak will not thrive under them, as they do immediately under the Birch.

“ Where a plantation is on a plain, a screen of Firs for its boundary is of singular
 “ use, but the situation of the Forest-land denies us this advantage.

“ We continue to cut down the tall-growing weeds two or three times the first
 “ summer, and perhaps once the next, or second season after planting; which is all
 “ that we do in respect to cleaning. The next winter after planting, we fill up the
 “ places with fresh plants where they have miscarried; after which there is little
 “ to be done till about the fourth or fifth year; by which time the small-sized Birch,
 “ and seedling Oaks, will be grown to a proper size for transplanting: In the thin-
 “ ning of these due care must be had not to take too many away in one season, but,
 “ being properly managed, there will be a supply of plants for at least half a dozen
 “ years to come.

“ About the same time that the lesser-sized Birch wants thinning, the large ones
 “ will require to have their lower branches taken off, so as to keep them from injuring
 “ the Oaks; and this is the first profit of our plantations, the Birch-wood being readi-
 “ ly bought up by the broom-makers. This pruning we continue as often as re-
 “ quired, till the Birches are grown to a sufficient size to make rails for fencing; we
 “ then cut them down to make room for their betters.

“ By this time the Oaks will be grown to the height of twelve or fourteen feet,
 “ when they draw themselves up exceedingly fast: Each plant seems as it were in a
 “ state of strife with its neighbour, and in a strict sense they are so, and on no other

the stirring of the ground about the roots of Oaks is to the trees, I have already hinted; and yet in copſes, where they ſtand warm, and ſo thickened with under-wood as this culture cannot be practiſed, they prove in time to be goodly trees. I have of late tried the graſſing of Oaks, but as yet with ſlender ſucceſs. Ruellius indeed affirms it will take the Pear and other fruit; and if we may credit the Poet,

————— Aurca duræ

Mala ferant Quercus. —————

ECL. viii.

The ſturdy Oak does golden Apples bear.

————— Glandemque ſues fregere ſub ulmiſ. GEORG. ii.

And greedy ſwine from grafted Elms are fed,
With falling Acorns that on Oaks are bred.

Which laſt I conceive to be the more probable; for that the ſap of the Oak is of an unkind tincture to moſt trees: but for this improvement, I

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“ terms than life for life; and he whoſe fate it is to be once over-topped, is ſoon after
“ compelled to give up the conteſt for ever.

“ After the Birches are cut down there is nothing more to be done but thinning the
“ Oaks, from time to time, as may be required, and cutting off their dead branches
“ as frequently as may be neceſſary. We are very cautious in doing the former, know-
“ ing well that if we can but once obtain length of timber, time will bring it into
“ thickneſs; therefore we let them grow very cloſe together for the firſt fifty years.

“ And here it may not be improper to obſerve the progreſs the Oak makes with us,
“ by deſcribing them in two of our plantations, one of twenty-eight, the other of
“ fifty years growth. In the former they are in general about twenty-five or twenty-
“ ſix feet in height, and in girth about eighteen inches: The trees in the latter,
“ planted in 1725, are ſomething more than ſixty feet in height, and in girth a little
“ above three feet; and theſe trees are in general about fifty feet in the bole, from
“ which you will eaſily conceive the ſmallneſs of their tops, even at this age.

“ It would be a difficult matter to deſcribe their farther progreſs with any degree of
“ certainty, therefore let it ſuffice to make this laſt obſervation on them in their mature
“ ſtate.

“ I ſhould have before obſerved to you, that in both the aforeſaid, as well as
“ in all the young plantations, the Spaniſh Cheſnut keeps an equal pace, or rather
“ out-grows the Oak; but it is doubtful whether ever they will arrive at the ſame
“ ſize; for the largeſt of our Spaniſh Cheſnuts, which have much the appearance of

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would rather advise inoculation, as the ordinary Elm upon the Wich-Hafel, for those large leaves we shall anon mention, and which are so familiar in France.

6. That the transplanting of young Oaks gains them ten years advance, some happy persons have affirmed. From this belief, if in a former impression I have desired to be excused and produced my reasons for it, I

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"old trees, do not girth more than twelve or fourteen feet, which is nothing in comparison to some of our large Oaks, which girth from twenty-five to thirty feet; indeed some of them a great deal more: For instance, that remarkable tree called the Greendale Oak, (from its growing in a valley of that name near Welbeck) which in the year 1724 had a hole cut through its body large enough to admit a coach to go thro'. This great curiosity is yet living, and frequently bears acorns, which we carefully save, to be distributed as presents amongst his Grace's acquaintance.

* See Ch. iii.
Book iii.

"I may omit describing to you the present state of this piece of antiquity, as I have herewith inclosed a drawing of it taken on the spot a few days ago*, from which you will see, notwithstanding the uncommon size of the lower part of the tree, that it has never contained any great quantity of timber; I mean in comparison with several of our largest Oaks, some of which contain, in their tower-like trunks, between seven and eight hundred solid feet of timber, exclusive of their stately tops; and some of their large branches are even like trees themselves.

"You see, Sir, what a surprising mass of wood may arise from a single acorn! Indeed it is really wonderful to see, on some soils, to what an amazing size this King of Trees will sometimes arrive."

Welbeck, June 16, 1775.

Having thus described the most approved methods of raising woods and plantations from the acorn and the nursery, I shall now proceed to consider the necessity of reducing them to immediate practice.

And first I shall observe, that the cutting down of all kinds of wood is become so general, that unless some effectual remedy be soon applied, it is more than probable that very little full-grown timber will be left in this island for the use of the ship-builder. The simple apprehension that this nation will, at some distant period, feel this great calamity, cannot but occasion some uneasiness in the minds of those who wish well to their country. But when the most serious and positive proofs can be produced, that, at this very moment, the royal navy is in want of that supply, how justly are our fears increased!—and with what zeal ought we to join in warding off the impending danger?

In the year 1763, Mr. Roger Fisher, an eminent ship-builder at Liverpool, actuated by a very laudable spirit for the interest of his country, laid before the public a num-

shall not persist against any sober man's experience; and therefore leave this article to their choice, since, as the butcher's phrase is, change of pasture makes fat calves; and so transplantations of these hard-wood trees, when young, may possibly, by a happy hand, in fit season, and other circumstances of soil, sun, and room for growth, be an improvement. But as for those who advise us to plant Oaks of too great a stature, they hardly make any considerable progress in an age; and therefore I cannot encourage it, unless the ground be extraordinarily qualified, or that the Oak you would transplant be not above six or seven feet growth in height; yet if any be desirous to make trial of it, let their stems be of the smoothest and tenderest bark, for that is ever an indication of youth, as well as the paucity of their circles, which, in disbranching and cutting the head off at five or six feet height (a thing, by the way, which the French usually spare when they transplant this tree) may, before you stir their roots, serve for the more certain guide; and then plant them immediately, with as much earth as will adhere to them, in the place destined for their station, abating only the tap-root*, (which is that downright and stubby part of the roots which all trees raised of seeds do universally produce) and quickening some

* Which yet some, upon good experience, will not allow in transplanting young Oaks; affirming the taking them up without any abatement, or the least wound, does exceedingly advance the growth of this tree above such as are deprived of it.

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*ber of original letters written by persons conversant in the purchase of ship-timber in almost every county of this kingdom. In 1771, the Hon. Augustus Hervey desired these letters to be republished, which was accordingly done; and much about the same time, the Editor received a summons to attend a committee of the house of commons, before whom he gave a faithful narrative of what he personally knew of the then scarcity of Oak-timber. In consequence of his examination, and other informations exhibited by creditable dealers in wood, an act was obtained to encourage the growth of timber upon commons and waste lands: But how far the inclinations of the people have operated with the wisdom of the legislature, I am unable to determine.

As an inducement to raise plantations of useful timber, I shall here observe, that the ships which gave laws to the whole world in the last war, were constructed from Oaks planted soon after the publication of Mr. Evelyn's *Silva*; and I flatter myself that the present *republication* will be the means of raising the same virtuous and patriotic spirit. We have just before us a princely example: His present Majesty has, with Royal Munificence, ordered a nursery, consisting of twenty acres of land, to be formed upon the forest of Knareborough, to which the tenants of the crown are to have unlimited access for the purpose of supplying themselves (*gratis*) with young Oaks, and all sorts of trees proper for the forest.

It is remarkable that the Oak was held sacred by the Greeks, the Romans, the Gauls, and Britons. Among the Romans this tree was dedicated to Jupiter, as we are informed by Pliny: "Arborum genera numinibus suis dicata perpetuo servantur, ut

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of the rest with a sharp knife (but sparing the fibrous, which are the main suckers and mouths of all trees) spread them in the fofs or pit which hath been prepared to receive them: I say in the fofs, unless you will rather trench the whole field, which is incomparably the best, and infinitely to be preferred before narrow pits and holes, as the manner is, in case you plant any number considerable, the earth being hereby made loose, easier and penetrable for the roots, about which you are to cast that mould which, in opening of the trench, you took from the surface, and purposely laid apart, because it is sweet, mellow, and better impregnated. But, in this work, be circumspect never to enter your stem deeper than you found it standing, for profound burying very frequently destroys a tree, though an error seldom observed. If, therefore, the roots be sufficiently covered to keep the body steady and erect, it is enough; and the not minding of this trifling circumstance does very much deceive our ordinary wood-men, as well as gardeners, for most roots covet the air, though those of the *Quercus Urbana* least of any; for, like the *Esculus*,

— Quæ quantum vertice ad auras
Æthereas, tantum radice in Tartara tendit.

GEORG. ii.

High as his topmost boughs to heaven ascend,
So low his roots to hell's dominion tend.

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“*Jovi esculus.*” By the Britons it was held in great veneration; and some of the most solemn ceremonies of the Druids were held under its sacred shade. The ceremony of cutting the mistle is circumstantially described by Cæsar, Tacitus, and Pliny.

The Acorns, produced by the different species of Oaks, are supposed to have constituted part of the food of mankind in the early ages of the world. Lucretius, speaking of the first age, says,

Glandiferas inter curabant corpora quercus
Plerumque. —————

Lib. v. l. 937.

Virgil celebrates Ceres for having first taught mankind how to grow corn for food.

Prima Ceres ferro mortales vertere terram
Instituit: cum jam glandes atque arbuta sacre
Deficerent sylvæ, & victum Dodona negaret.

GEORG. i. 147.

And in consequence of this great obligation, the Roman husbandmen, before they began their harvest, always crowned their heads with wreaths of Oak in honour of Ceres.

————— Neque ante
Falcem maturis quisquam supponat aristas,
Quam Cereri, torta redimitus tempora quercu,
Det motus incompósitos, et carmina dicat.

GEORG. i. 347.

And the perfection of that does almost as much concern the posterity of a tree, as of a man himself, since *Homo* is but *Arbor inversa*, which prompts me to this curious but important advertisement, *that the position be likewise sedulously observed.* CHAP. III.

7. For the southern parts of all trees being more dilated, and the pores exposed (as evidently appears in their horizontal sections) by the constant excentricity of the hyperbolical circles (save just under the equator, where the circles concentre, as we find in those hard woods which grow there) ours, being now on the sudden, and at such a season, turned to the north, does starve and destroy more trees, how careful soever men have been in ordering the roots and preparing the ground, than any other accident whatsoever, neglect of staking and defending from cattle excepted; the importance whereof caused the best of poets, and most experienced in this argument, when giving advice concerning this article, to add,

Quin etiam coeli regionem in cortice signant:

Ut, quo quæque modo steterit, quâ parte calores

Austrinos tulerit, quæ terga obverterit axi,

Restituant: adeo in teneris consuefcere multum est. GEORG. II.

Beside, to plant it as it was, they mark

The heav'n's four quarters in the tender bark;

And to the north or south restore the side,

Which at their birth did heat or cold abide:

So strong is custom; such effects can use

In tender souls of pliant plants produce.

Which motion, though Pliny and some others think good to neglect, or esteem indifferent, I can confirm from frequent losses of my own, and by particular trials, having sometimes transplanted great trees at Midsummer with success (the earth adhering to the roots) and miscarried in others, where this circumstance only was omitted.

To observe therefore the coast and side of the stock, especially of fruit-trees, is not such a trifle as by some pretended; for if the air be as much the mother or nurse, as water and earth, as more than probable it is, such blossoming plants as court the motion of the meridian sun, do, as it were, evidently point out the advantage they receive from their position, by the

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clearness, politure, and comparative splendor of the south side; and the frequent mossiness of most trees on the opposite side, does sufficiently note the unkindness of that aspect, most evident in the bark of Oaks white and smooth, the trees growing more kindly on the south side of an hill than those which are exposed to the north, with an hard, dark, rougher and more mossy integument, as I can now demonstrate in a prodigious coat of it investing some pyracanthus which I have removed to a northern dripping shade. I have seen (writes a worthy friend to me on this occasion) whole hedge-rows of apples and pears that quite perished after that shelter was removed; the good husbands expected the contrary, and that the fruit should improve, as freed from the predations of the hedge; but use and custom made that shelter necessary, and therefore, saith he, a stock for a time is the weaker, taken out of a thicket, if it be not well protected from all sudden and fierce invasions, either of crude air or winds. Nor let any be deterred, if, being to remove many trees, he shall esteem it too consumptive of time; for, with a brush dipped in any white colour or oaker, a thousand may be speedily marked as they stand; and that once done, the difficulty is over. I have been the larger upon these two remarks because I find them so material, and yet so much neglected*.

8. There are other rules concerning the situation of trees; the former author commending the north-east wind, both for the flourishing of the tree, and advantage of the timber; but, to my observation, they thrive the best in those parts of our climate where those sharp winds do rather flanker than blow fully opposite upon our plantations; and there are as well other circumstances to be considered, as they respect rivers, and marshes obnoxious to unwholesome and poisonous fogs, hills, and seas, which expose them to the weather, and those *silvi-fragi venti*, our cruel and tedious western winds; all which I leave to observation, because these accidents do so universally govern, that it is not easy to determine farther, than that the timber is commonly better qualified which hath endured the colder aspects without these prejudices. And hence it is that Seneca observes, wood most exposed to the winds to be the most strong and solid; and that therefore Chiron made Achilles's spear of a mountain tree; and of those the best, which

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* When it is judged necessary to transplant trees of a large size, Mr. Evelyn's advice seems highly to be commended, though Mr. Miller treats it as chimerical. In smaller trees the caution is unnecessary.

grow thin, not much sheltered from the north. Again, Theophrastus seems to have special regard to places, exemplifying in many of Greece, which exceed others for good timber, as, doubtless, do our Oaks in the forest of Dean all others of England: And much certainly there may reasonably be attributed to these advantages for the growth of timber, and of almost all other trees, as we daily see by their general improsperity, where the ground is a hot gravel, and a loose earth. An Oak or Elm in such a place shall not, in an hundred years, overtake one of fifty, planted in its proper soil; though next to this, and, haply, before it, I prefer the good air. Thus have they such vast Junipers in Spain; and the Ash in some parts of the Levant (as of old near Troy) so excellent, as it was after mistaken for Cedar, so great was the difference from situation; now the Cantabrian, or Spanish, exceeds any we have elsewhere in Europe. And we shall sometimes, in our own country, see woods within a little of each other, and, to all appearance, growing on the same soil, where Oaks of twenty years growth, or forty, will, in the same bulk, contain their double in heart and timber; and that in one the heart will not be so big as a man's arm, when the trunk exceeds a man's body. This ought therefore to be weighed in the first plantation of copses, and a good eye may discern it in the first shoot; the difference proceeding, doubtless, from the variety of the seed; and therefore great care should be had of its goodness, and that it be gathered from the best sort of trees, as was formerly hinted in the third section of the first chapter.

9. *Veterem arborem transplantare*, was said of a difficult enterprize: Yet before we take leave of this paragraph, concerning the transplanting of great trees, let us shew what is possible to be effected in this kind, with cost and industry. Count Maurice, the late governor of Brazil for the Hollanders, planted a grove near his delicious paradise of Friburgh, containing six hundred Cocoa-trees of eighty years growth, and fifty feet high to the nearest bough; these he wafted upon floats and engines four long miles, and planted them so luckily that they bore abundantly the very first year, as Gaspar Barlaeus hath related in his elegant description of that prince's expedition. Nor hath this only succeeded in the Indies alone; Monsieur de Fiat, one of the Marechals of France, hath with huge Oaks done the like at Fiat. Shall I yet bring you nearer home? A great person in Devon planted Oaks as big as twelve oxen could draw, to supply some defect in an avenue to one of his houses, as the Right Honourable

BOOK I. the Lord Fitz-Harding, late treasurer of his Majesty's household, assured me, who had himself likewise practised the removing of great Oaks by a particular address, extremely ingenious, and worthy the communication.

10. Choose a tree as big as your thigh, remove the earth from about it, cut through all the collateral roots, till, with a competent strength, you can enforce it down upon one side, so as to come with your ax at the tap-root; cut that off, re-dress your tree, and so let it stand, covered about with the mould you loosened from it, till the next year, or longer if you think good, then take it up at a fit season; it will likely have drawn new tender roots apt to take, and sufficient for the tree, wheresoever you shall transplant it. Some are for laying bare the whole root, and then dividing it into four parts, in form of a cross, to cut away the interjacent rootlings, leaving only the cross and master-roots that were spared to support the tree; then, covering the pit with fresh mould, as above, after a year or two, when it has put forth and furnished the interstices you left between the cross-roots with plenty of new fibres and tender shoots, you may safely remove the tree itself so soon as you have loosened and reduced the four decussated roots, and shortened the tap-roots; and this operation is done without sloping or bending the tree at all: And if, in removing it, you preserve as much of the clod about the new roots as possible, it would be much the better.

Pliny notes it as a common thing to re-establish huge trees which have been blown down, part of their roots torn up, and the body prostrate; and, in particular, speaks of a fir that, when it was to be transplanted, had a tap-root which went no less than eight cubits perpendicular. And to these I could super-add, by woeful experience, where some Oaks and other old trees of mine tore up, with their fall and ruin, portions of earth, in which their former spreading roots were engaged, little less in bulk and height than some ordinary cottages and houses built on the common: Such havock was the effect of the late prodigious hurricane. But to proceed. To facilitate the removal of such monstrous trees for the adornment of some particular place, or the rarity of the plant, there is this farther expedient: A little before the hardest frosts surprise you, make a square trench about your tree, at such distance from the stem as you judge sufficient for the root; dig this of competent depth, so as almost quite to undermine it, by placing blocks and quarters of wood to sustain the earth; this done, cast in as much water as may fill the trench, or at least sufficiently wet it, unless the ground was very moist before; thus

let it stand till some very hard frost do bind it firmly to the roots, and then convey it to the pit prepared for its new station, which you may preserve from freezing by laying store of warm litter in it, and so close the mould the better to the straggling fibres, placing what you take out about your new grafted to preserve it in temper; but in case the mould about it be so ponderous as not to be removed by an ordinary force, you may then raise it with a crane or pulley, hanging between a triangle made of three strong and tall limbs united at the top, where a pulley is fastened, as the cables are to be under the quarters which bear the earth about the roots; for by this means you may weigh up, and place the whole weighty clod upon a trundle, sledge, or other carriage, to be conveyed and replanted where you please, being let down perpendicularly into the place by the help of the foresaid engine: And by this address you may transplant trees of a wonderful stature without the least disorder, and many times without topping, or diminution of the head, which is of great importance where this is practised to supply a defect, or remove a curiosity.

11. Some advise that, in planting of Oaks, &c. four or five be suffered to stand very near to one another, and then to leave the most prosperous when they find the rest to disturb its growth; but I conceive it were better to plant them at such distances as they may least incommode one another: For timber-trees, I would have none nearer than forty feet where they stand closest, especially of the spreading kind.

12. Lastly, Trees of ordinary stature transplanted (being first well watered) must be sufficiently staked and bushed about with thorns to protect them from the concussion of the winds, and from the casual rubbing and poisonous brutting of cattle and sheep, the oiliness of whose wool is also very noxious to them, till being well grown and fixed (which by seven years will be to some competent degree) they shall be able to withstand all accidental invasions but the ax; for I am now come to their pruning and cutting, in which work the seasons are of main importance.

13. Therefore, if you would propagate trees for timber, cut not off their heads at all, nor be too busy with lopping; but if you desire shade and fuel, or bearing of mast alone, lop off their tops, fear, and unthriving branches only. If you intend an outright felling, expect till November; for this premature cutting down of trees before the sap is perfectly at rest will be to your exceeding prejudice, by reason of the worm, which will

Book I. certainly breed in timber which is felled before that period; but in case you cut only for the chimney, you need not be so punctual as to the time; yet, for the benefit of what you let stand, observe the moon's increase, if you please. The reason of these differences is, because this is the best season for the growth of the tree which you do not fell, the other for the durableness of the timber which you do; now, that which is to be burnt is not so material for lasting, as the growth of the tree is considerable for the timber; but of these particulars more at large in chap. iii. book iii.

14. The very stump of an Oak, especially that part which is dry and above ground, being well grubbed, is many times worth the pains and charge for sundry rare and hard works; and, where timber is dear, I could name some who, abandoning this to workmen for their pains only, when they perceived the great advantage, repented of their bargain, and undertaking it themselves were gainers above half: I wish only, for the expedition of this knotty work, some effectual engine were devised, such as I have been told a worthy personage of this nation made use of, by which he was able, with one man, to perform more than with twelve oxen; and surely there might be much done by fastening of iron hooks and fangs about one root to extract another, the hook chained to some portable screw or winch; I say such an invention might effect wonders, not only for the extirpation of roots, but the prostrating of huge trees*. That small engine, which by some is called the German Devil, reformed after this manner, and duly applied, might be very expedient for this purpose; but this is to be practised only where you design a final extirpation; for some have drawn suckers from an old stub root; but they certainly perish by the moss which invades them, and are very subject to grow rotten. Pliny speaks of one root which took up an entire acre of ground, and Theophrastus describes the Lycean Platanus to have spread an hundred feet; if so, the argument may hold good for their growth after the tree is come to its period. They made cups of the roots of Oaks heretofore; and such a curiosity Athenæus tells us was carved by Thericleus himself; and there is a way so to tinge Oak, after long burying and soaking in water, which gives it a wonderful politure, as that it has frequently been

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* This wish is truly accomplished in the ERADICATOR invented by the Hon. Capt. Bentinck, and constructed by Mr. Cole, Engine-maker in London. The death of the ingenious inventor, at the time when the drawings were nearly compleated, has deprived this work of one of its most useful ornaments.

taken for a coarse Ebony: Hence, even by floating, comes the Bohemian Oak, Polish, and other northern timber, to be of such excellent use for some parts of shipping: But the blackness which we find in Oaks that have long lain under ground (and may be called subterranean timber) proceeds from some vitriolic juice of the bed in which they lie, which makes it very weighty; but, as the excellent naturalist and learned physician, Dr. Sloane, observes, it dries, splits, becomes light, and soon impairs.

15. There is not in nature a thing more obnoxious to deceit than the buying of trees standing, upon the reputation of their appearance to the eye, unless the chapman be extraordinarily judicious, so various are their hidden and concealed infirmities till they be felled and sawn out; so, as ir to any thing applicable, certainly there is nothing which does more perfectly confirm it than the most flourishing outside of trees, *fronti nulla fides*. A timber tree is a merchant adventurer,—you shall never know what he is worth till he be dead.

16. Oaks, in some places where the soil is especially qualified, are ready to be cut for copse in fourteen years, and sooner; I compute from the first sémation. Though it be told as an instance of high encouragement, (and as indeed it merits) that a lady in Northamptonshire sowed acorns, and lived to cut the trees produced from them twice in two-and-twenty years, and both as well grown as most are in sixteen or eighteen. This yet is certain, that acorns set in hedge-rows have, in thirty years, borne a stem of a foot diameter. Generally, copse-wood should be cut close, and at such intervals as the growth requires, which, being seldom constant, depends much on the places and the kinds, the mould and the air; and for which there are extant particular statutes to direct us; of all which more at large hereafter. Oak for tan-bark may be felled from April to the last of June, by a statute in 1 Jacobi; and here are some for the disbarking of Oaks, and so to let them stand before they fell.

17. To enumerate now the incomparable uses of Oak were needless; **USES.** but so precious was the esteem of it, that of old there was an express law amongst the twelve tables concerning the very gathering of the acorns, though they should be found fallen in another man's ground. The land and the sea do sufficiently speak for the improvement of this excellent material; houses and ships, cities and navies are built with it; and there is a kind

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of it so tough, and extremely compact, that our sharpest tools will hardly enter it, and scarcely the very fire itself, in which it consumes but slowly, as seeming to partake of a ferruginous and metalline shining nature, proper for fundry robust uses. It is doubtless, of all timber hitherto known, the most universally useful and strong; for though some trees be harder, as Box, Cornus, Ebony, and divers of the Indian woods, yet we find them more fragil, and not so well qualified to support great incumbencies and weights; nor is there any timber more lasting, which way soever used. There has, we know, been no little stir amongst learned men, of what material the cross was made on which our blessed Saviour suffered: Venerable Bede, in Collectaneis, affirms it to have been framed of several woods, namely, Cypress, Cedar, Pine, and Box; and to confirm it, St. Hierom has cited Isaiah lx. 13. *Gloria Libani ad te veniet, & Buxus & Pinus simul ad ornandum locum sanctificationis mee, & locum pedum meorum significabo*; but, following the version of the LXX, he reads, *in Cupresso, Pinu, & Cedro, &c.* Others insert the Palm, and so compose the cross of no less than four different timbers, according to the old verse:

Quatuor ex lignis Domini crux dicitur esse.
 Pes crucis est Cedrus, corpus tenet alta Cupressus;
 Palma manus retinet, Titulo lætatur Oliva.

Nail'd were his feet to Cedar, to Palm his hands,
 Cypress his body bore, Title on Olive stands:

And for this of the Palm, they fetch it from that of Cant. vii. 8. where 'tis said, *Ascendam in Palmam, & apprehendam fructus ejus**, and from other allegorical and mysterious expressions of the sacred text without any manner of probability; whilst by Alphonfus Ciacconius, Lipsius, Angelus Rocca, Falconius, and divers other learned men, writing on this subject, and upon accurate examination of the many fragments pretended to be parcels of it, 'tis generally concluded to have been the Oak; and I do verily believe it, since those who have described those countries assure us there is no tree more frequent, which, with relation to several celebrations and mysteries under Oaks in the Old Testament, has been the subject of many fine discourses. Nor is it likely they should choose or assemble so many sorts of

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* The Septuagint has it more properly, "*Ascendam in palmam, tenebo cacumina ejus.*"

woods, with that curiosity, to execute one upon whom they esteemed a malefactor; besides, we read how heavy it was, which Cypress, Cedar, and Palm are not in comparison with Oak; whilst Gretser denies all this, lib. i. cap. vi. and concludes, upon his accurate examination of several fragments yet extant, that 'tis not discernible of what timber it was framed. We might add to these the furious zeal of the bloody and malicious Jews, to see our blessed Lord inhumanly executed, could not possibly allow leisure to frame a cross of so many rare and curious materials: Let this therefore pass for an errant legend*.

That which is twined and a little wreathed (easily to be discerned by the texture of the bark) is best to support burthens, for posts, columns, summers, &c. for all which our English Oak is infinitely preferable to the French, which is nothing so useful, nor comparably so strong; inasmuch as I have frequently admired at the sudden failing of most goodly timber to the eye, which, being employed to these uses, does many times most dangerously fly in sunder, as wanting that native spring and toughness which our English Oak is endued withal. And here we forget not the stress which Sir. H. Wotton, and other architects, put even in the very position of their growth, their native straightness and loftiness for columns, supporters, cross-beams &c. and 'tis found that the rough-grained body of a stubbed Oak is the fittest timber for the case of a cyder-mill, and such like engines, as best enduring the unquietness of a ponderous rolling-stone. It is good for shingles, pales, laths, cooper's ware, clap-board for wainscot (the ancient *intestina opera* †—works within doors) and some pannels curiously veined, of much esteem in former times, till the finer-grained Spanish and Norway timber came amongst us, which is likewise of a whiter colour. There is in New England a certain red Oak which, being felled, they season in some moist and muddy place, which branches into very curious works. It is observed that Oak will not easily glue to other wood, nor very well with its own kind; and some woods will never cohere tolerably, as the Box and Hornbeam, though both very hard; so, nor Service with Cornell, &c. Oak is excellent for wheel spokes, pins, and

† And therefore were joiners called intestinary. See Leg. ii. Cod. Theodof.

NOTES.

* The whole of this seems an unnecessary digression. A superstitious Monk might be allowed to waste his time in investigations of this nature; but a serious and practical Christian, in the humility of his soul, will despise such ridiculous fooleries, and content himself with the bare truth of the historical fact, as recorded in the books of the New Testament.

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pegs for tiling, &c. Mr. Blith makes spars and small building timber of Oaks of eleven years growth, which is a prodigious advance. The smallest and straightest is best, discovered by the upright tenor of the bark, as being the most proper for cleaving; the knottiest for water-works, piles, and the like, because it will drive best and last longest; the crooked, yet firm, for knee-timber in shipping, mill wheels, &c *. In a word, how absolutely necessary the Oak is above all the trees of the forest in naval architecture, &c. consult Whitson, lib. i. cap. xiii.

Were planting of this wood more in use, we should banish our hoops of hazel, &c. for those of good Copsé-Oak, which, being made of the younger shoots, are exceeding tough and strong; one of them, being of Ground-Oak, will out-last six of the best ash; but this our coopers love not to hear of, who work by the great for sale, and for others. The smaller trunchions and spray make billet, bavin, and coals; and the bark is of price with the tanner and dyer, to whom the very saw-dust is of use, as are the ashes and lee for bucking linen, and to cure the ro-pishness of wine: And as it is probable the cups of our acorns would tan leather as well as the bark, I wonder no body makes the experiment, as done in Turkey with the valonia, which is a kind of acorn growing on the Oaks. The Ground-Oak, while young, is used for poles, cudgels, and walking-staffs, much come into mode of late, but to the waste of many a hopeful plant which might have proved good timber; and I the rather declaim against the custom, because I suspect they are such as are for the most part cut and stolen by idle persons, and brought up to London in great bundles, without the knowledge or leave of the owners, who would never have gleaned their copses for such trifling uses. Here I am again to give a general notice of the peculiar excellency of the roots of most trees, for fair, beautiful, chamleted, and lasting timber, applicable to many purposes; such as formerly made hafts for daggers, hangers, knives, handles for staves, tobacco-boxes, and elegant joiners' work, and even for some mathematical instruments of the larger size, to be had either in or near the roots of many trees; however, 'tis a kindness to

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* Every person who can measure timber thinks himself qualified to value standing trees; but such men are often deceived in their estimates. It is the perfect knowledge of the application of the different shaped trees that enables a man to be correct in his valuation. A foot of wood may be of little value to one trade, but of great value to another. This is the grand secret which enriches the purchasers of standing timber.

premonish stewards and surveyors, that they do not negligently waste those materials: Nor may we here omit to mention tables for painters, which heretofore were used by the most famous artists, especially the curious pieces of Raphael, Durer, and Holbein, and before that of canvases, and much more lasting: To these add the galls, mistleto, polypod, agaric, used in antidotes, uvæ, funguses to make tinder, and many other useful excrescences, to the number of above twenty, which doubtless discover the variety of transudations, percolations, and contextures of this admirable tree; but of the several fruits and animals generated of them, and other trees, Francisco Redi promises an express treatise in his *Esperienze intorno alla Generatione de gl' Insetti*, already published. Pliny affirms, that the galls break out all together in one night, about the beginning of June, and arrive to their full growth in one day; this I should recommend to the experience of some extraordinary vigilant wood-man, had we any of our Oaks that produced them, Italy and Spain being the nearest that do. Galls are of several kinds, but grow upon a different species of Robur from any of ours, which are never known to bring these excrescences to maturity; the white and imperforated are the best; of all which, and their several species, see Jasp. Bauhinus, and the excellent Malpighius, in his *Discoursé de Gallis*, and other morboous tumours raised by, and producing insects, infecting the leaves, stalks, and branches of this tree with a venomous liquor or froth, wherein they lay and deposit their eggs, which bore and perforate these excrescences when the worms are hatched, so as we see them in galls.

What benefit the mast does universally yield, once in two years at least, for the fattening of hogs and deer, I shall shew upon another occasion before the conclusion of this discourse. A peck of Acorns a day, with a little bran, will make a hog, 'tis said, increase a pound weight per diem for two months together. They give them also to oxen, mingled with bran, chopped or broken; otherwise they are apt to sprout and grow in their bellies*. Others say they should first be macerated in water to extract their malignity, cattle many times perishing without this prepara-

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* The food taken in by ruminant animals does not remain long enough in the stomach and intestinal canal to encourage the germination of acorns, mast, or any kind of seed. And if such a luxuriancy of vegetation should take place, still no bad consequence could possibly arise from it.

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tion. Cato advises the husbandman to reserve two hundred and forty bushels of acorns for his oxen, mingled with a like quantity of beans and lupines, and to drench them well. But, in truth, they are more proper for swine, and, being so made small, will fatten pidgeons, peacocks, turkeys, pheasants, and poultry; nay, it is reported that some fishes feed on them, especially the tunny, in such places of the coast where trees hang over arms of the sea. Acorns, before the use of wheat-corn was found out, were heretofore the food of men, nay, of Jupiter himself, as well as other productions of the earth, till their luxurious palates were debauched: And even in the time of the Romans, the custom was, in Spain, to make a second service of acorns and malt, as the French now do of marrons and chesnuts, which they likewise used to roast under the embers.

& quernâ glande repasta.

Equassè annosâ vivendò corpòra quercus.

Fed with the oaken mast;

The aged trees themselves in years surpass'd.

And men had indeed hearts of Oak; I mean, not so hard, but healthy and strength, and lived naturally, and with things easily parable and plain.

Fælix illa ætas mundi, justissima Nymphæ,

Cum dabat umbra domum vivam tua, cùm domus ipsa

Dèciduâ dominos pascebat fruge quietos,

Solâque præbebant sylvestria poma secundas

Gramineis epulas mensis; nondum arte magistra

Arbor adulteriis præluserat insita nostris. COULEU Pl. l. vi.

Blest age o' th' world, just Nymph, when man did dwell

Under thy shade whence his provision fell;

Sallads the meal, wildings were the desert:

No tree yet learn'd, by ill example, art,

With insidious fruit, to symbolize,

As in an emblem, our adulteries.

Thus the sweet Poet bespeaks the Dryad; and therefore it was not called Quercus, as some etymologists fancied, because the Pagans (*queribantur responsa*) had their oracles under it, but because they sought for acorns:

But it is in another * place where I shew you what this acorn was. And even now I am told, that those small young acorns which we find in the stock-doves craws are a delicious fare, as well as those incomparable fallads, young herbs taken out of the maws of partridges at a certain season of the year, which gives them a preparation far exceeding all the art of cookery. Oaks bear also a knur, full of a cottony matter, of which they anciently made wick for their lamps and candles; and among the *Selettiora Remedia* of *Jo. Prævotius*, there is mention of an oil *è querna glande* chemically extracted, which he affirms to be of the longest continuance, and least consumptive of any other whatsoever for such lights, *ita ut uncia singulis mensibus vix consumatur continuo igne*. The ingenious author of the Description of the Western Isles of Scotland tells us, that, upon his own experience, a rod of Oak, of four, five, six, or eight inches about, being twisted like a wyth, boiled in wort, well dried, and kept in a little bundle of barley-straw, and then steeped again in wort, causes it to ferment, and procures yeast. The rod should be cut before mid-day, and is frequently used in this manner to furnish yeast, and, being preserved, will serve, and produce the same effect many years together; and, as the historian affirms, that he was shewed a piece of thick wyth which had been kept for making ale with for above twenty years †. In the mean time, the leaves of Oaks, abundantly congested on snow, preserve it as well for wine as a deep pit, or the most artificial refrigeratory. Nor must we pass by the sweet mel-dews, so much more copiously found on this tree than any other, whence the industrious bees gather such abundance of honey, as that, instead of carrying it to their hives, they glut themselves to death: But, from this ill report, hastily taken up by *Euricius Cordus*, our learned Mr. Ray has vindicated this temperate and abstemious useful creature. *Varro* affirms they made salt of Oak ashes, with which they sometimes seasoned meat, but more frequently made use of it to sprinkle among, and fertilize their seed-corn; which minds me of a certain Oak, found buried somewhere in Transylvania near the salt pits, that was entirely converted into an hard salt when they came to examine it by cutting. This experiment, if true, may possibly encourage some other attempts for the multiplying of salt. Nor less strange is that which some report of a certain water,

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† Yeast retains, from a variety of experiments, the power of communicating a ferment for many months. In the above case it insinuates itself between the fibres of the wood, which close upon it, and only give it to the wort when warmed and moistened.

Book I. somewhere in Hungary, which transmutes the leaves of this tree into brass, and iron into copper*. Of the galls is made trial of spaw-water, and the ground and basis of several dyes, especially sadder colours, and are a great revenue to those who have quantities of them. Nor must I forget ink, composed of galls $\mathfrak{z}$ iiij, copperas $\mathfrak{z}$ ij, gum-arabic $\mathfrak{z}$ i; beat the galls grossly, and put them into a quart of claret or French wine, and let them soak for eight or nine days, setting the vessel (an earthen glazed pitcher is best) in the hot sun, if in summer, but in winter near the fire, stirring it frequently with a wooden spatula; then add the copperas and gum; and after it has stood a day or two it will be fit to use. There are a world of receipts more, of which see Caneparius *de Atramētis*. Of the very moss of the Oak, that which is white composes the choicest cypress-powder, which is esteemed good for the head; but impostors familiarly vend other mosses under that name, as they do the fungi (excellent in hæmorrhages and fluxes) for the true agaric, to the great scandal of Physic. Young red oaken leaves, decocted in wine, make an excellent gargle for a sore mouth; and almost every part of this tree is sovereign against fluxes in general, and where astringents are proper. The dew that impearls the leaves in May, insolated, meteorizes, and sends up a liquor which is of admirable effect in ruptures. The liquor issuing out between the bark, which looks like treacle, has many sovereign virtues. And some affirm the water stagnate in the hollow stump of a newly felled Oak is as effectual as *lignum sanctum* in the foul disease, and also stops a diarrhæa. And a water distilled from the acorns is good against the pthifick, stitch in the side, and heals inward ulcers, breaks the stone, and refrigerates inflammations, being applied with linen dipt therein: Nay, the acorns themselves, eaten fasting, kill the worms, provoke urine, and, some affirm, break even the stone itself. The coals of Oak, beaten and mingled with honey, cure the carbuncle. We shall say nothing of the viscuses, polypods, and other excrescences, of which innumerable remedies are

N O T E S.

*Brass is a facitious metal, and never discovered in a natural state; so that what Mr. Evelyn here says must be regarded as fabulous. With respect to what he mentions of iron being converted into copper, there is the appearance of truth in the experiment. In Ireland there is a spring, into which, if plates of iron are laid, they will be converted, in a few weeks, into copper: But in this case there is a fallacy, and no real transmutation. The particles of iron are corroded by the acid in the water, and the particles of the copper, minutely suspended in the menstruum, are deposited in their place. In this manner considerable quantities of copper are collected.

composed, noble antidotes, syrups, &c. Nay, it is reported that the very shade of this tree is so wholesome, that the sleeping, or lying under it, becomes a present remedy to paralyticks, and recovers those whom the mistaken malign influence of the Walnut-tree has smitten †. But what is still more strange, I read in one Paulus, a physician of Denmark, that a handful or two of small Oak buttons, mingled with oats, given to horses which are black of colour, will, in a few days eating, alter it to a fine dapple grey, which he attributes to the vitriol abounding in this tree *.

To conclude, upon serious meditation of the various uses of this and other trees, we cannot but take notice of the admirable mechanism of vegetables in general, as in particular in this species, that, by the diversity of percolations, and strainers, and by mixtures, as it were of divine chemistry, various concoctions, &c. the sap should be so green on the indented leaves, so lustily esculent for hardier and rustic constitutions in the fruit; so flat and pallid in the atramental galls; and, haply, so prognostic in the apple; so suberous in the bark (for even the Cork-tree is but a coarser Oak); so ouzie in the tanner's pit; and, in that subduction, so wonderfully specific in corroborating the entrails and bladder, reins, loins, back, &c. which are all but the gifts and qualities, with many more, that these robust sons of the earth afford us; and that, in other specifics, even the most despicable and vulgar Elder imparts to us in its rind, leaves, buds, blossoms, berries, ears, pith, bark, &c. which hint may also carry our remarks upon all the varieties of shape, leaf, seed, fruit, timber, grain, colour, and all those other forms that philosophers have enumerated; but which were here too many for us to repeat.

N O T E S.

† The antients, who were fond of refreshing themselves under the shade of trees, caution us against the influence of the Walnut. Pliny says of its shade, “*gravis et noxia, etiam capiti humano, omnibusque juxta fati.*” Lib. xvii. c. xviii.

* The wood contains no vitriol; neither can the fact, relative to change of colour, be true. The medicinal virtues here enumerated are not to be depended on, excepting in cases where astringents are indicated.

C H A P. IV.

The E L M. *

1. **U**LMUS, the Elm. Of this there are four or five sorts, and, from the difference of the soil and air, divers spurious: Two of these kinds are most worth your culture, viz. the Vulgar, or Mountain Elm, which is taken to be the *Oriptelea* of Theophrastus, being of a less jagged and smaller leaf; and the Vernacula, or French Elm, whose leaves are thicker, and more florid, glabrous, and smooth, delighting in the lower and moister grounds, where they will sometimes rise to above an hundred feet in height, and a prodigious growth, in less than an age; myself having seen one planted by the hand of a countess, living not long since, which was near twelve feet in compass, and of an height proportionable, notwithstanding the numerous progeny which grew under the shade of it, some whereof were at least a foot in diameter, that, for want of being seasonably transplanted, must needs have hindered the procerity of their ample and indulgent mother: I am persuaded some of these were *Viviparæ* & *Traduces*, produced of the falling seeds.

2. For though both these sorts are raised of appendices or suckers, as anon we shall describe, yet this latter comes well from the *samera*, or seeds, and therefore I suppose it to be the ancient *Atinia*; for such an Elm

N O T E S.

* The Elm is the next tree which offers itself to our observation; and it deserves this place, whether we consider its beauty when growing, or its usefulness when felled. Of the Elm there are six kinds enumerated by Mr. Miller.

1. *ULMUS (Campestris) foliis oblongis acuminatis, duplicato-ferratis, basi inaequalibus.* Elm with oblong acute-pointed leaves, which are doubly sawed on their edges, and unequal at their base. *Ulmus vulgarissima, folio lato, scabro.* Ger. Emac. 1480. The common rough, or broad-leaved Wych Elm.

This sort is very common in the north-west counties of England, where it grows to a very large size, and is generally believed to grow naturally in the woods. The bark of the young branches is smooth and very tough, but that of the old trees cracks and is rough. The branches spread, and do not grow so thick as those of the third sort. The leaves are rough, and are doubly sawed on their edges. Their base is unequal, about three inches long and two broad, of a dark green colour, and stand upon short foot-stalks. The flowers come out in March upon



The common Elm Tree.

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they acknowledge to be raised of seeds, which, being ripe about the beginning of March, though frequently not till the following month, will produce them; as we might have seen abundantly in the gardens of the Thuilleries, and that of Luxemburg, at Paris, where they usually sow themselves, and come up very thick; and so do they in many places of our country, though seldom taken notice of, as that it is esteemed a fable by the less observant and ignorant vulgar: Let it therefore be tried in season, by turning and raking some fine earth, often refreshed, under some amply spreading tree; or to raise them of their seeds, being well

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the slender twigs, standing in clusters; they are of a deep red colour; these are succeeded by oval bordered capsules, containing one roundish compressed seed, which ripens in May. The wood of this tree is good for all the purposes of any kind of Elm; but the leaves do not come out till late in the spring, so there are few persons who plant these trees near their habitations.

2. *ULMUS (Scabra)* foliis oblongo-ovatis inæqualitur ferratis, calycibus foliaceis. *Elm with oblong oval leaves which are unequally sawed, and have leafy empalements to the flowers.* *Ulmus folio latissimo, scabro.* Ger. Eamc. 1481. *The Wych Hazel, or rough and very broad-leaved Elm; by some unskilful persons called the British Elm.*

This sort grows naturally in some of the northern counties of England, where it is frequently called Wych-Hazel, from the resemblance of the young shoots and leaves to those of Hazel. It grows to a tree of great magnitude. The bark of the young shoots is very smooth and tough; it is of a yellowish brown colour, with spots of white. The leaves are oval, six inches long, and almost four broad, and are unequally sawed on their edges. The flowers grow in clusters toward the end of the twigs; they have long leafy empalements of a green colour, and appear in the spring before their leaves, and the seeds ripen the latter end of May. The wood of this tree is not so good for use as that of the first sort. Formerly, when long bows were in use, many of them were made of the boughs of this tree.

3. *ULMUS (Sativa)* foliis ovatis acuminatis duplicato-ferratis, basi inæqualibus. *Elm with oval acute-pointed leaves which are doubly sawed, and unequal at their base.* *Ulmus minor, folio angusto, scabro.* Ger. Emac. 1480. *The small-leaved or English Elm.*

This kind is commonly known in the nursery-gardens by the title of English Elm, which is far from being a right appellation; for it is not a native of England, and is only found growing near London, or in plantations where the young trees were procured from the neighbourhood of London. Where this tree grows naturally, is not easy to determine; some persons have supposed it was brought from Germany. As it is well known, it requires no description. The flowers are of

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dried a day or two before, sprinkled on beds prepared of good loamy fresh earth, and sifting some of the finest mould thinly over them, and watering them when need requires: Being risen, which may be within four or five months, an inch above ground, refreshed and preserved from the scraping of birds and poultry, comfort the tender seedlings by a second sifting of more fine earth to establish them; thus keep them clean weeded for the first two years, cleansing the side boughs; or, till being of fitting stature to remove into a nursery at wider intervals and even rows, you may thin and transplant them in the same manner as you were directed for your young Oaks, only they shall not need above one cutting,

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a purplish red colour, and generally appear the beginning of March; but I could never observe any seeds upon this sort.

4. *ULMUS (Glabra)* foliis ovatis glabris, acutè serratis. *Elm with oval smooth leaves, which are sharply sawed on their edges.* *Ulmus folio glabro.* Ger. Emac. 1481. *The smooth-leaved Wych Elm.*

This is very common in several parts of Hertfordshire, Essex, and other north-east counties of England, where it grows to a large tree, and is much esteemed. The branches spread out like those of the first sort. The leaves are oval, and sharply sawed on their edges; they are smoother than most of the other sorts, and do not appear till the middle or latter end of May, so that this kind is seldom planted near habitations.

5. *ULMUS (Hollandica)* foliis ovatis acuminatis rugosis, inæqualiter serratis, cortice fungoso. *Elm with oval, acute-pointed, rough leaves, which are unequally sawed, and a fungous bark.* *Ulmus major Hollandica, angustis & magis acuminatis fameris, folio latissimo, scabro.* Pluk. Alm. *The Dutch Elm.*

This sort is well known by the title of Dutch Elm; it was brought from Holland the beginning of King William's reign, and was for some time a fashionable tree, and has been recommended for its quick growth; it was some years ago in great request for forming hedges in gardens, for which purpose it was one of the most improper trees that could be chosen, on account of its making very strong irregular shoots distant from each other. The leaves being very large and rough, and the branches covered with a fungous rough bark, the hedges, when sheared, appeared naked and disagreeable the whole summer after. The wood of this tree is good for nothing, so it is almost banished this country.

6. *ULMUS (Minor)* foliis oblongo-ovatis glabris acuminatis duplicato-serratis. *Elm with oblong, smooth, acute-pointed leaves, which are doubly sawed.* *Ulmus minor, folio angusto, glabro.* *The smooth narrow-leaved Elm, by some called the upright Elm.*

This is found growing in hedge-rows in several parts of England. The branches have a smooth grayish bark, and grow erect. The leaves are narrower, and

where they grow less regular and hopeful. But, because this is an experiment of some curiosity, obnoxious to many casualties, and that the producing them from the mother-roots of greater trees is very facile and expeditious, besides the numbers which are to be found in the hedge-rows and woods, of all plantable sizes, I rather advise our forester to furnish himself from those places.

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more pointed than those of the English Elm, and are smoother; they are later in coming out in the spring than those, but continue longer in autumn: It has been by some called the Irish Elm.

Of the Elm there are some other varieties which are preserved in the nursery-gardens; but their difference is not remarkable enough to deserve notice, therefore they are omitted, as are also those with variegated leaves, of which there are several sorts propagated in the nurseries about London.

The Elm is stationed in the class and order *Pentandria Digynia*, there being in each flower five stamina and two styles. The flowers are in full bloom about the beginning of April, and the leaves open about the middle of the same month, but the seeds are not ripe before the beginning of June.

Elms are propagated by layers, by seeds, and by grafting on their own kind.

In order to propagate them by layers, proper stools for the purpose must be first obtained; to procure which, let a piece of good ground be double dug, and let Elms of about four or five feet high be planted in it, at the distance of about ten feet: If they make good shoots in the first year, they may be cut down early the spring following; if not, they should remain two years before they are headed for stools; which should be done by cutting them down to within half a foot of the ground. After they are cut down, they should be suffered to grow undisturbed for two years: The ground between the stools must be dug in the winter, and constantly hoed as the weeds arise in the summer; and at the end of that time, that is two years, the branches growing from these stools will be fit for layering, which may be performed thus: Excavate a piece of ground wide enough to receive a whole branch, and let the hollow be about half a foot deep; then splash the branch with a knife, near the body of the stool, that its head may be more readily brought into the prepared place: Next, thrust an hooked stick into the ground to hold it down; take off all the superfluous branches which cross, and would otherwise incommode those that are to be continued: After this, slit all the remaining young branches half way through, turning the edge of the knife towards the extremity of the branch. When this is done the mould should be gently put amongst them, and they should all have their ends bent towards the stool, that the slit may be kept open. Lastly, having the whole vacuity filled with its own mould, smooth and even, take off the end of each twig that peeps above the ground, down to one eye; and the branch, thus laid, will afford as many plants as there are buds peeping out of the

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3. The suckers which I speak of are produced in abundance from the roots, whence, being dextrously separated, after the earth has been well loosened, and planted about the end of October, they will grow very well; nay, the stubs only, which are left in the ground after a felling, being fenced in as far as the roots extend, will furnish you with plenty, which may be transplanted, from the first year or two, successively, by

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ground. Proceed in like manner to the other branches of the same stool, then to the next stool in order, and so on until the whole business of layering be finished.

By the autumn following, these layers will have taken root, and many of them will have made a shoot of near a yard in length. It is then necessary to take them from their stools, and plant them in some double-dug ground in the nursery. They should be set in rows three feet asunder, and the distance allowed them from each other in the rows ought to be a foot and an half. Here they may stand till they are planted out where they are to remain, with no farther trouble than digging the ground between the rows every winter, and, in the summer, carefully watching those which shoot out two branches at the head, and nipping the weakest of them off.

After the layers are taken up, the stools must have all the wounded parts, occasioned by the former splashing, taken away; the old branches also should be cut off pretty close to the stem, and in the spring they will begin to shoot out fresh branches again for a second layering, which will likewise be ready to have the same operation performed the second year after: And thus may this layering be performed on these stools every other year. But nurserymen, who would raise great quantities of trees this way, should be provided with two quarters of stools, to come in alternately, so that from one or other of them they may annually receive a crop.

Another, and by far the most expeditious method of raising Elms, is by sowing the seeds; but this practice chiefly respects the Wych Elm, the seeds of the others very rarely ripening in this country. In order, therefore, to obtain a good quantity of these Elms, let the seeds be gathered the beginning of June, it being the time when they are full ripe. When gathered, spread them three or four days to dry; for, if they were to be sown immediately after they were gathered, they would rot. Having been spread about that time, and the ground, which ought to be fresh and good, being in readiness for their reception, mark out your beds four feet wide, and let the alleys between them be a foot and an half or two feet broad. Rake the mould out of the beds until they are about an inch deep; riddle that which came out of the beds into them again, until the bottom of each bed be raised half an inch (*i. e.* half filled) with riddled mould; then gently press the mould down with the back of the spade, and sow the seeds thinly all over it with an even hand, covering them down with fine earth about half an inch deep. When the seeds are all sown this way, the beds should be hooped and covered with mats, to shade the plants during the hot season; and they should also sometimes be refreshed with water: Part of the young plants will come up in about a month, or sooner; the others not till the spring following. From

slipping them from the roots, which will continually supply you for many years, after that the body of the mother-tree has been cut down: And from hence probably is sprung that (I fear) mistake of Salmasius and others, where they write of the growing of their chips (I suppose having some of the bark on) scattered in hewing of their timber; the error pro-

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the time the seeds are sown to their appearance above ground, whenever rain falls, be careful to uncover the beds, and be as ready to cover them again when the scorching beams of the sun break out. About the end of August, the mats should be wholly taken away, that the plants may be hardened against winter: The spring following, a fresh breed will present themselves among those that came up the summer before: All the summer following they should be constantly kept free from weeds, and watered as often as dry weather shall render it necessary; and in October, or spring, they may be planted out in the nursery, at the distance before prescribed for the layers, and afterwards should be managed like them.

Grafting is the next method of propagating Elms, all the sorts of which may be increased this way: The stocks for the purpose should be the broad-leaved Wych Elm, which must be raised from the seed, and planted out as before. When they have grown two years in the nursery they will be of proper size to receive the graft; the beginning of March is the best time for the work. If a large quantity of Elm stocks are to be grafted, procure six men in readiness for the purpose: The business of the first man is to take the mould from the stem of the stocks, with a spade, down to the root, laying the top of the root bare; the next man is to follow him with a sharp pruning-knife, cutting off the heads of the stocks, and leaving the stumps to be grafted only about two inches above the root; the third man is the grafter himself, who, having his grafts cut about four or five inches in length, all of the young wood, and such as have never bore lateral branches, in a dish, takes out one of them, and, holding it in his left hand, the taper end being from him, with the knife that is in his right, he takes off a slope about an inch and an half, or two inches long; and, if the grafter be an artist, it will be cut as true as if wrought by a plane: This done, he forms a tongue by making a small slit upwards, beginning from the top of the slope, and then proceeds to prepare the stock to receive it, which is effected by sloping off a side of it, of the same length with the sloped graft, that the parts may fit as near as possible: He then makes a cut, nearly at the top of the stock, downward, to receive the tongue he had made in the graft; and, having properly joined them, he proceeds to the next. After the grafter, follows a person with bask matting, cut into proper lengths; and, with these, he ties the grafts pretty close to the stock. The fifth man brings the clay, which should have been prepared a week, or longer, before, and well worked and beaten over, mixed with a fourth part of horse-dung, and some chopped hay, in order to make it hang the better together; with this he furrounds the graft and the stock. Lastly, the sixth man comes and closes the clay, so that there may be no probability of its being washed off. Two or three

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ceeding from this, that, after an Elm-tree has been felled, the numerous suckers, which shoot from the remainders of the latent roots, seem to be produced from this dispersion of the chips: Let this yet be more accurately examined; for I pronounce nothing magisterially, since it is so confidently reported.

4. I have known stakes, sharpened at the ends for other purposes, take root familiarly in moist grounds, and become trees; and divers have essay-

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rows being grafted, let an additional hand or two be employed, either in drawing the earth up above the clay, so that it may be wholly covered, or digging the ground between the rows, and levelling it so, that nothing of the performed work may appear, except the tops of the grafts, above ground. The danger of frost renders this precaution highly necessary; for, if it should be delayed a night or two, and sharp frosts should happen, the clay will, most of it, fall off; and thus the work will require to be repeated; whereas, when it is lapped warm in the manner directed, there will be no danger of such an accident.

A good workman, with the above-mentioned necessary assistance, will graft about a thousand stocks in a day. In the spring, the buds will swell, disclose, and shoot forth nearly as soon as those of the tree from which they were taken. By the latter end of June they will be shot a foot, or about a foot and a half; when they should be freed from the clay; the matting should be also taken off, and themselves left to sport at ease with all the vegetative powers. At this time, of those which have put forth two shoots, the weakest should be taken off, to strengthen the other, and to lighten the head, which would otherwise be subject to be broken off by high winds. By autumn the shoot will have grown about a yard in length; and, in the winter, the ground should be dug between the rows.

In this place they may remain till they are of a size to be planted out for continuance, with no other trouble than what was directed for the layers; namely, keeping them clear of weeds, digging between the rows in the winter; at the same time taking off all very large side-branches; and, in the summer, pinching such young shoots, in the head, as may have a tendency to make the tree become forked.

This practice of grafting will be found a valuable improvement of the English Elm, if we consider the nature of the Wych Elm, on which it is grafted. First, the Wych Elm will not only grow to the largest size of all the sorts, but will grow the fastest. However, this is not to be wondered at, if we examine the root, which we shall find more fibrous, and the pores larger, and in greater number than in any of the other Elms. Now, as all roots are of a spongy nature, to receive the juices of the earth for the nourishment and growth of the tree, that tree must necessarily grow the fastest whose root is most spongy and porous; and therefore the true English Elm, being set upon the root of the Wych, a greater quantity of nutriment is received from the earth for its increase, in proportion as the root of the Wych Elm is more spongy and porous.

ed, with extraordinary success, the trunchions of the boughs and arms of Elms, cut to the scantling of a man's arm, about an ell in length: These must be chopped on each side opposite, then laid into trenches about half a foot deep, and covered about two or three fingers deep with good mould. The season for this work is towards the exit of January, or early in February, if the frosts impede not; and, after the first year, you may cut or save

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than that of its own sort. Thus the English Elm, on this basis, will arrive at timber many years sooner than those raised by layers, and be also forced to a greater size.

All kinds of Elms, the Wych excepted, are proper to plant in hedge-rows, upon the borders of fields, where they will thrive much better than when planted in a wood, or close plantation, and their shade will not be very injurious to whatever grows under them; but when these trees are transplanted out upon banks after this manner, the banks should be well wrought, and cleared from all other roots, otherwise the plants, being taken from a better soil, will not make much progress in these places. Michaelmas will be a good time for this work; but when they are planted, there should be some stakes fixed in by them, to which they should be fastened to prevent their being displaced by the winds, and part of their heads should be taken off before they are planted, which will also be of use in preventing their being easily overturned by winds; but by no means should their leading shoot be stopped, nor the branches too closely cut off; for if there are not some shoots left on to draw and attract the sap, they will be in danger of miscarrying.

These trees are also proper to plant at a distance from a garden, or building, to break the violence of winds, for which purpose there is not any tree more useful; for they may be trained up in form of a hedge, keeping them cut every year, which will cause them to grow very close and handsome to the height of forty or fifty feet, and be a great protection against the fury of winds; but they should not be planted too near a garden, where fruit-trees or other plants are placed, because the roots of the Elms run superficially upon the ground to a great distance, and will intermix with the roots of other trees, and deprive them of nourishment; nor should they be planted near gravel or grass walks, which are designed to be well kept, because the roots will run into them, and send forth suckers in great plenty, which will deface the walks, and render them unsightly. It must however be considered, that by grafting the English Elm upon the Wych stock, the inconveniences from the spreading of the roots will be removed.

The Elm may be removed when grown to a considerable size; so that a person who is willing to have his plantations for shade in a short time, may procure trees of near one foot circumference in their trunk, which will be in little danger of miscarrying, provided they are removed with care: And these will take root, and grow very well, though not so well as young plants, which is what few other sorts of trees will do; but then they should be such trees as have been thus regularly trained up in a nursery, and have good roots, and not such as are taken out of hedge-rows, (as is by some practised) which seldom rise with any tolerable roots, and consequently often miscarry.

BOOK I. the trunchions off in as many places as you find cause, and as the shoots and rooted sprouts will direct you for transplantation. Another expedient for the propagation of Elms is this: Let trenches be sunk at a good distance, viz. twenty or thirty yards from such trees as stand in hedge-rows, and in such order as you desire your Elms should grow: Where these gutters are, many young Elms will spring from the small roots of the ad-

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and this has been the occasion of so many plantations of these trees failing; for altho' some of them may live a few years, yet few of them are of long duration, and they rarely increase much in their stems; but frequently grow hollow, their heart decaying first, so that they are supported only by their bark or shell, for a few years, and the first severe winter, or very dry summer, they are generally destroyed.

Although I have said that Elms, which are trained up in a nursery, may be removed with safety, at a larger size than most other trees, yet I would not have it understood, that by this I would recommend the planting of them when large; for if people would have a little patience when they plant, and never plant any of these trees which are more than four or five inches in the girth of the stem, they would, in a few years, have better trees than if they had put down such as were of a larger size; besides, small trees are much more easily removed, and do not require to be so strongly supported, nor is there much danger of their miscarrying; therefore it is much more eligible to make choice of young thriving trees, and never to plant any large ones, unless where a small number may be wanted for an immediate shade.

In planting of Elms, great care must be taken not to bury their roots too deep, which is very injurious to them, especially if they are planted on a moist loam or clay; in which case, if the clay be near the surface, it will be the best way to raise the ground in a hill, where each tree is to be planted, which will advance their roots above the surface of the ground, so that they will not be in danger of rotting in winter with moisture.

When these trees are propagated by suckers taken from the foot of old trees, they are commonly laid into the ground in rows pretty close together in beds, where, in dry weather, they may be frequently watered to encourage their putting out roots. In these beds they are left commonly two years, by which time those that live will be rooted (though a great many of them generally die); they then are transplanted into the nursery, and managed as hath been directed for layers: But this method is not to be commended.

The Wych Elm is by no means proper to plant in hedge-rows or open fields, as it will throw out monstrous large arms, and thereby appear not so beautiful as the English Elm: Few of these therefore should be planted, unless it be to make a contrast with the others. This tree, however, is very proper to be planted for woods; for, being near each other, they will aspire like the Oak; no great arms will be produced, but a clear noble trunk will present itself to a great height.

Whoever is desirous of having an *Ulmarius*, or wood of these Elms, must raise the plants in the seminary, as before directed; and afterwards plant them in the

joining trees. Divide, after one year, the shoots from their mother-roots, which you may dextrously do with a sharp spade, and these, transplanted, will prove good trees without any damage to their progenitors. Or do thus: Lop a young Elm; the lop being about three years growth; do it in the latter end of March, when the sap begins to creep up into the boughs, and the buds are ready to break out; cut the boughs into lengths of four feet slanting, leaving the knot where the bud seems to put forth in the middle: Inter these short pieces in trenches of three or four inches deep, and in good mould well troden, and they will infallibly produce you a crop; for even the smallest suckers of Elms will grow, being set when the sap is newly stirring in them. There is yet a fourth way, no less expeditious, and frequently confirmed with excellent success: Bare some of the master-roots of a vigorous tree within a foot of the trunk, or thereabouts, and with your ax make several chops, putting a small stone into every cleft to hinder the closure, and give access to the wet;

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nursery. The rows need not be wider than two feet, nor the plants above a foot asunder, if ground is scarce, as they must be soon taken from hence to form the wood: When they are about three or four feet high, they will be of a proper size for this purpose. The ground should be prepared ready for their reception, which I would advise to have done by double digging; but, if this should be thought too expensive, and the plantation is designed to be very large, let it be plowed all over very deep with a very strong plow, that the turf, or rich soil at the surface, may be work'd down in order to receive the roots of the plants when they strike, and send them forth with more vigour. This being done, make the holes all over the ground; and, as these trees are not so large as those planted for standards, they need not be so wide; a foot and a half will be sufficient; and if there be any turf, see that it is chopt small at the bottom of them. If the best mould, designed to lap the roots in, is not very pliable or fine, it will be proper to let the holes lie open some time, and the mould be exposed to the sun, rain, and frost, which will greatly mellow it, and render it more fit for the purpose. The distance of these holes should be two yards. Having taken the trees out of the nursery, cut off all large lateral branches, and shorten the other side-shoots in proportion to the root; and, having also taken off all the bruised parts of the roots, proceed to plant them. After this, they will require no farther care till their branches begin to touch one another; when they should be thinned, by taking away every second, or rather the less-thriving trees, all over the plantation. Thus they may continue until the branches meet again, when they should undergo a second thinning, grubbing up always the old roots, and so on, to the pleasure and profit of the owner, till the trees are arrived at maturity, when they will be noble, lofty, and valuable.

Columella, in his twelfth chapter *de Arboribus*, informs us, that Elms were principally employed in making living props to vines; and that vineyards, formed upon this

BOOK I. then cover them with three or four inches of earth, and thus they will send forth suckers in abundance; I assure you, one single Elm, thus well ordered, is a fair nursery, which, after two or three years, you may separate and plant in the *Ulmarium*, or place designed for them; and which, if it be in plumps, as they call them, within ten or twelve feet of each other, or in hedge-rows, it will be better; for the Elm is a tree of comfort, sociable, and so affecting to grow in company, that the very best which I have ever seen do almost touch one another: This also protects them from the winds, and causes them to shoot of an extraordinary height, so as, in little more than forty years, they arrive to a load of timber, provided they be sedulously and carefully cultivated, and the soil propitious; for an Elm does not thrive so well in the forest, as where it may enjoy scope for the roots to dilate and spread at the sides, as in hedge-rows and avenues, where they have the air likewise free. Note, that they spring abundantly by layers also.

5. There is, besides these sorts we have named, one of a more scabrous harsh leaf, but very large, which becomes an huge tree, (frequent in the northern counties) and is distinguished by the name of the Witch-Halle in our Statute Books, as serving formerly to make long bows of: The timber is not so good as the first more vulgar; but the bark, at a proper season of the year, will serve to make coarse bast-rope.

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extensive plan, were named *Arbusta*, the vines themselves being called *Arbustive Vites*, to distinguish them from others raised in more confined situations. Since the introduction of silk-worms into Italy, the Mulberry trees, in many places, are pollarded for the double purpose of supporting vines, and supplying leaves for feeding the worms. Once in two years the Elms were carefully pruned, to preserve their leaves from overshadowing the grapes; and this operation was deemed of great importance: Corydon is reproached for a double neglect, in suffering both his Elms and Vines to remain unpruned.

Semiputata tibi frondosa vitis in ulmo est.

Ecl. ii. 70.

Virgil, in his elegant description of the implements of husbandry, recommends the *buris*, or plow-tail, to be made of an Elm bent in the woods.

Continuo in filvis magna vi flexa domatur

In burim, et curvi formam accipit Ulmus aratri.

Geor. i. 170.

Among the ancients, it was customary to plant about their tombs such trees as bore no seeds, particularly the Elm.

Jove's Silvan daughters bade their Elms bestow

A barren shade, and in his honour grow.

POPE'S HOMER, vi. 530.

6. Of all the trees which grow in our woods, there is none which does better suffer the transplantation than the Elm; for you may remove a tree of twenty years growth with undoubted success: It is an experiment I have made in a tree almost as big as my waist; but then you must totally disbranch him, leaving only the summit entire; and, being careful to take him up with as much earth as you can, refresh him with abundance of water. This is an excellent and expeditious way for great persons to plant the accesses of their houses with; for, being disposed at sixteen or eighteen feet interval, they will, in a few years, bear goodly heads, and thrive to admiration. Some that are very cautious, emplaster the wounds of such over-grown Elms with a mixture of clay and horse dung, bound about them with a wisp of hay or fine moss; and I do not reprove it, provided they take care to temper it well, so as the vermin nestle not in it. But, for more ordinary plantations, younger trees, which have their bark smooth and tender, clear of wens and tuberous branches, (for those of that sort seldom come to be stately trees) about the scantling of your leg, and their heads trimmed at five or six feet height, are to be preferred before all other. Cato would have none of these sorts of trees to be removed till they are five or six fingers in diameter; others think they cannot take them too young; but experience, the best mistress, tells us, that you can hardly plant an Elm too big*. There are who pare away the root within two fingers of the stem, and quite cut off the head; but I cannot commend this extreme severity, no more than I do the strewing of oats in the pit; which, fermenting with the moisture and frequent waterings, is believed much to accelerate the putting forth of the roots; not considering that, for want of air, they corrupt and grow musty, which more frequently suffocates the roots, and endangers the whole tree.

7. I have affirmed how patient this tree is of transplantation; not only for that I observe so few of them to grow wild in England, and where it

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* It seems to have been thought an excellence amongst the Roman husbandmen to be able to transplant large trees. Virgil represents the old Corycian as possessed of that knowledge in a high degree:

Ille etiam seras in versum distulit Ulmos,

Eduramque pirum, & spinos jam pruna ferentes,

Jamque ministrantem platanum potantibus umbras. GEORG. IV. 144.

In these verses, it is remarkable that the poet has bestowed upon the trees such epithets as prove them to have been of considerable stature.

BOOK I. may not be suspected but they or their predecessors have been planted by some industrious hand; but, for that those incomparable walks and vistas of them, both at Aranjuez, Casel del Campo, Madrid, the Escorial, and other places of delight, belonging to the King and Grandees of Spain, are planted with such as, they report, Philip the second caused to be brought out of England; before which, as that most honourable person, the Earl of Sandwich, when his Majesty's Ambassador Extraordinary at that court, writ to me, it does not appear there were any of those trees in all Spain. But, of that plantation, see it more particularly described in chapter VII. book III. of this discourse, whither I refer my reader; whilst, as to my own inclination, I know of no tree amongst all the foresters, becoming the almost interminat lontananza of walks and vistas, comparable to this majestic plant.

8. The Elm delights in a sound, sweet, and fertile land, something more inclined to loamy moisture, and where good pasture is produced; though it will also prosper in the gravelly, provided there be a competent depth of mould, and be refreshed with springs; in defect of which, being planted on the very surface of the ground, the swarth pared first away, and the earth stirred a foot deep or more, they will undoubtedly succeed; but, in this trial, let the roots be handsomely spread, and covered a foot or more in height, and, above all, firmly staked. This is practicable also for other trees, where the soil is over moist or unkind; for, as the Elm does not thrive in too dry, sandy, or hot grounds, no more will it abide the cold and spungy; but in places that are competently fertile, or a little elevated from these annoyances, as we see in the mounds and casting up of ditches, upon whose banks the female sort does more naturally delight, though it seems to be so much more addicted to some places than to others, that I have frequently doubted whether it be a pure indigene* or translatitious; and not only because I have hardly ever known any considerable woods of them, (besides some few nurseries near Cambridge planted, I suppose, for store) but almost continually in tufts, hedge-rows, and mounds; and that Shropshire, and several other counties, and rarely any beyond Stamford to Durham, have any growing in many miles together. In the mean time, some affirm they were first

N O T E S.

* The Elm is certainly an indigenous tree, of which there can be no stronger proof than that there are near forty places in this kingdom which have their names from it, most of which are mentioned in Doomsday-book.

brought out of Lombardy, where indeed I have observed very goodly trees about the rich grounds, with Pines among them; for I hear of none either in Saxony or Denmark, nor in France, growing wild, who all came and preyed upon us after the Romans. But I leave this to the learned.

9. The Elm is, by reason of its aspiring and tapering growth, unless it be topped to enlarge the branches and make them spread low, the least offensive to corn and pasture-grounds; to both which, and the cattle, they afford a benign shade, defence, and agreeable ornament; but then, as to pastures, the wandering roots, (apt to infect the fields and grafs with innumerable suckers) and the leading mother-root, ought to be quite separated on that part, and the suckers eradicated: The like should be done where they are placed near walks of turf or gravel.

10. It should be planted as shallow as may be; for, as we noted, deep interring of roots is amongst the catholic mistakes, and this the greatest to which trees are obnoxious. Let new-planted Elms be kept moist by frequent refreshings upon some half-rotten fern, or litter, laid about the foot of the stem, the earth being a little stirred and depressed, for the better reception and retention of the water.

11. Lastly, your plantations must, above all things, be carefully preserved from cattle, and the concussions of impetuous winds, till they are out of reach of the one, and sturdy enough to encounter the other.

12. When you lop the side-boughs of an Elm, (which may be about January, for the fire, and, more frequently, if you desire to have them tall, or that you would form them into hedges, for so they may be kept plashed, and thickened to the highest twig, affording both a magnificent and august defence against the winds and sun) I say, when you trim them, be careful to indulge the tops, for they protect the body of your trees from the wet, which always invades those parts first, and will, in time, perish them to the very heart; so as Elms, beginning thus to decay, are not long prosperous. Sir Hugh Platt relates, as from an expert carpenter, that the boughs and branches of an Elm should be left a foot long, next the trunk, when they are lopped; but this is, to my certain observation, a very great mistake, either in the relater or author; for I have noted of many Elms, so disbranched, that the remaining stubs grew

BOOK I.

immediately hollow, and were as so many conduits or pipes, to hold, and convey the rain to the very body and heart of the tree.

13. There was a cloyster of the right French Elm in the little garden near to her Majesty's, the Queen-mother's, chapel at Somerset-house, which were, I suppose, planted there by the industry of the F. F. Capuchines, that would have directed you to the incomparable use of this noble tree, for shade and delight, into whatever figure you will acustom them. I have myself procured some of them from Paris, but they were so abused in the transportation, that they all perished, save one which now flourishes with me: I have also lately grafted Elms, to a great improvement of their heads. Virgil tells us they will join in marriage with the Oak *, and they would both be tried; and the success for such lignous kinds will be the more probable, if you graff under the earth, upon or near the very root itself, which is likely to entertain the cyon better than when more exposed, till it be well fixt, and have made some considerable progress.

14. When you would fell, let the sap be perfectly in repose, as it is commonly about November or December, even to February, after the frost hath well nipped them: I have already alledged my reason for it; and I am told, that, both Oak and Elm so cut, the very saplings, whereof rafters, spars, &c. are made, will continue as long as the very heart of the tree, without decay. In this work, cut your kerfe near to the ground, but have a care that the tree suffers not in the fall, and be ruined with its own weight: This depends upon your wood-man's judgment in disbranching, and is a necessary caution to the felling of all other timber-trees. If any begin to doat, pick out such for the ax, and rather trust to its successor; and, should you cut over late, by floating them two or three months in the water, it prevents the worm, and proves the best of seasons.

15. Elm is a timber of most singular use, especially where it may lie continually dry or wet, in extreams; therefore proper for water-works, mills, the ladles and soles of the wheel, pipes, pumps, aquæducts, pales, ship-planks beneath the water-line; and some that have been found buried

N O T E S.

* Virgil is very animated in his idea of engrafting an Oak upon an Elm. He represents the acorns as the fruit of the marriage; and the swine cracking them under the tree. "Glandemque sues fregere sub Ulmis."

in bogs, has turned like the most polished and hardest ebony, only discerned by the grain; also for wheel-wrights, handles for the single hand-saw, &c. rails and gates made of Elm, thin sawed, are not so apt to rive as Oak; the knotty for naves, hubs; the straight and smooth for axle-trees; and the very roots for curiously dappled works; it scarce has any superior for kerbs of coppers, featheridge, and weather-boards, (but it does not, without difficulty, admit the nail without boring) chopping blocks, blocks for the hat-maker, trunks and boxes to be covered with leather, coffins, dressers and shovel-board tables of great length, and a lustrous colour if rightly seasoned; also for the carver, by reason of the tenor of the grain, and toughness, which fits it for all those curious works of frutages, foliage, shields, statues, and most of the ornaments appertaining to the orders of architecture, and for not being much subject to warping. I find that, of old, they used it even for hinges and hooks of doors; but then, that part of the plank which grew towards the top of the tree, was, in work, to be always reversed; and, for that, it is not so subject to rift: Vitruvius commends it both for tenons and mortaises: But, besides these, and fundry other employments, it makes also a second sort of charcoal; and, finally, which I must not omit, the use of the very leaves of this tree, especially of the female, is not to be despised; for, being suffered to dry in the sun upon the branches, and the spray stripped off about the decrease in August, as also where the suckers are supernumerary and hinder the thriving of their nurses, they will prove a great relief to cattle, in winter and scorching summers, when hay and fodder is dear; they will eat them before oats, and thrive exceedingly well with them; remember only to lay your boughs up in some dry and sweet corner of your barn.—It was for this the poet praised them, and the epithet was advised:

Fœcundæ frondibus Ulm.

VIRG.

Fruitful in leaves the Elm.

In some parts of Herefordshire they gather them in sacks for their swine and other cattle, according to this husbandry*. But I hear an ill report of this tree for bees, that, surfeiting of the blooming seeds, they are

N O T E S.

*The Roman husbandmen fed their cattle with the leaves of Elm: Columella, speaking of this practice, says, “Est autem Ulmus longe lætior et procerior, quam nostras, frondemque jucundiorē bubus præbet: qua cum assidue pecus alueris, et “postea generis alterius frondem dare institueris, fastidium bubus affert.”

BOOK I.

obnoxious to the lask* at their first going abroad in spring, which endangers whole stocks, if remedies be not timely adhibited; therefore, 'tis said, in great Elm countries they do not thrive; but the truth of which I am yet to learn. The green leaf of the Elm, contused, heals a green wound or cut, and, boiled with the bark, consolidates fractured bones. All the parts of this tree are absterfive, and therefore sovereign for the consolidating wounds; they assuage the pains of the gout; and the bark,

NOTES.

* Virgil gives a most beautiful description of this malady, so fatal to his favourite bees:

But when, as human ills descend to bees,
The pining nation labours with disease;
Chang'd is their glittering hue to ghastly pale,
Roughness and leanness o'er their limbs prevail;
Forth the dead citizens with grief are borne,
In solemn state the sad attendants mourn.
Clung by the feet they hang the live-long day
Around the door, or in their chambers stay;
Hunger and cold, and grief, their toils delay.
'Tis then in hoarser tones their hums resound,
Like hollow winds the rustling forest round,
Or billows breaking on a distant shore;
Or flames in furnaces that inly roar.
Galbanean odours here I shall advise;
And thro' a reed to pour the sweet supplies
Of golden honey, to invite the taste
Of the sick nation, to their known repast:
Bruis'd galls, dry'd roses, thyme, and centuary join,
And raisins ripen'd on the Plithian vine.
Besides, in meads the plant Amellus grows,
And from one root thick stalks profusely throws,
Which easily the wand'ring simpler knows:
Its top a flower of golden hue displays,
Its leaves are edg'd with violet-tinctur'd rays;
Rough is the taste; round many an holy shrine
The sacred priests its beauteous foliage twine:
This, where meand'ring Mella laves the plains,
Or in the new-shorn valley, seek the swains;
Its roots infuse in wine, and at their door
In baskets hang the medicated store.

WARTON.

decocted in common water, to almost the consistence of a syrup, adding a third part of aqua-vitæ, is a most admirable remedy for the ischiadica, or hip-pain, the place being well rubbed and chafed by the fire. For other wonderful cures performed by the liquor, &c. of this tree, see Mr. Ray's History of Plants, lib. xxv. cap i. sect. 5. And for other species of the Elm, consult his Supplement.

1. **F**AGUS, the Beech. I rank this tree before the martial Ash, because it commonly grows to a greater stature. It is of two or three kinds, and is numbered among the glandiferous trees. But here I may not omit a note of the accurate critic Palmerius, upon a passage in Theophrastus, where he animadvertes upon his interpreter, and shews that the ancient Φηγός was by no means the Beech, but a kind of Oak; for that the figure of the fruit is so widely unlike it, that being round, this triangular: And both Theophrastus and Pausanias make it indeed a species of Oak, as already we have noted in chap. iii. wholly differing in trunk, as well as fruit and leaf; to which he adds, (what determines the controversy) ξύλον τῆς φηγῶ ἰσχυρότατον καὶ ἀσπιδέστατον; that it is of a firmer timber, not obnoxious to the worm; neither of which can so confidently

N O T E S.

* The Beech is a beautiful, as well as a valuable tree. The leaves are of a pleasant green, and many of them remain on the branches during the winter, when they present themselves of a brown colour; for which reason this tree is proper to shelter habitations, and such places as require to be screened from violent winds. It may be planted either in woods or open fields, in both which stations it grows to a considerable height, and carries with it a proportionable trunk. In hedge-rows and the borders of fields it expands its branches to an amazing extent.—Of this genus there are three species.

1. FAGUS (*Sylvatica*) foliis ovatis obsoletè ferratis. Flor. Succ. 871. Sp. Plant. 998. Fagus. Germ. Em. 1444. Bauh. Pin. 419.

This is the common Beech, of which the buds begin to open about the fifteenth of April, and the leaves come out about the twenty-first. The flowers shew themselves about the twelfth of May, and by the fourth of June they are in full bloom. These are succeeded by the mast, an angular fruit, which is ripe in the autumn.

2. FAGUS (*Castanea*) foliis lanceolatis acuminato-ferratis subtus nudis. Hort. Cliff. 447. Castanea Sativa. Bauh. Pin. 419.

This is the Spanish Chestnut which is particularly described in Ch. viii.

3. FAGUS (*Pumila*) foliis lanceolato-ovatis acute ferratis subtus tomentosis, amentis filiformibus nodosis. Gron. Virg. 150. Castanea Pumila Virginiana, racemoso fructu parvo in singulis capsulis echinatis unico. Pluk. Alm. 90. Cateb. Car. 1. p. 9.

This species is called the Dwarf Chestnut, and grows to the height of ten feet. The stem is of a brown colour, and divides into several branches near the top. The



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berſaid of the Beech: Yet La Cerda, too, ſeems guilty of the ſame miſtake. But, leaving this, there are of our Fagi two or three kinds, viz. the Mountain, where it moſt affects to grow, which is the whiteſt, and moſt ſought after by the turner; and the Campeſtrial, or wild, which is of a blacker colour, and more durable. They are both to be raiſed from the maſt, and governed like the Oak, of which amply; and that is abſolutely the beſt way of furniſhing a wood; unleſs you will make a Nurſery, and then you are to treat the maſt as you are inſtructed in the chapter of Aſhes, ſowing them in autumn, or later, even after January, or rather nearer the ſpring, to preſerve them from vermin, which are very great de-

NOTES.

leaves, as deſcribed, are of an oval ſpear-shaped figure, acutely ſerrated with an hoary caſt on their underſide. The flowers come out in the ſpring in ſlender knotted catkins. They are of a greeniſh colour, and are rarely ſucceeded by ripe ſeeds in this country. This kind is very hardy, and thrives in a moiſt ſoil and ſhady ſituation.

The Beech, in the Linnæan ſyſtem, is ranked in the claſs and order *Monocotyledon*, which comprehends ſuch plants as have male and female flowers upon the ſame plant, the male flowers having numerous ſtamina.

This tree is propagated by ſowing the maſt in the ſeminary, and afterwards tranſplanting the feedlings into the nurſery; for which conſult the directions given in the notes upon page 44.

When theſe trees are deſigned for ſtandards in fields, parks, &c. they muſt be permitted to grow in the nurſery till they are of a proper ſize, when they ſhould be carefully taken up, and planted in the ſame manner as formerly directed for the Elm.—— When intended for woods, the ground muſt be prepared as for the Wych Elm; they ſhould be planted at the ſame diſtance, of the ſame ſize, and thinned in the ſame manner.

The Beech naturally delights in a chalky or ſtony ground, and the bark, upon ſuch land, is clear and ſmooth, a certain indication that the ſoil ſuits the tree. And altho' this timber is not ſo valuable as many other kinds, yet as it will thrive in ſoils and ſituations where few other trees will grow, the propagation of it ſhould be encouraged. Beſides this good quality, it is known to afford an agreeable ſhade; the leaves make a fine appearance in ſummer, and continue as late in autumn as any of the deciduous kinds.

When planted upon ſtony or chalky mountains, the Beech will reſiſt the winds better than moſt other trees, but then the plants ſhould be taken from a nurſery of a ſimilar ſoil; for if they are raiſed upon rich land and in a warm expoſure, and afterwards carried to a bleak ſituation and barren ſoil, they will ſeldom thrive: And this rule is generally ſuppoſed to hold good in moſt other trees, contrary to the practice

Book I.

vourers of them. But they are likewise to be planted of young seedlings, to be drawn out of the places where the fruitful trees abound. In transplanting them, cut off only the boughs and bruised parts two inches from the stem to within a yard of the top, but be very sparing of the root; this for such as are of pretty stature. They make spreading trees, and noble shades with their well-furnished and glistering leaves, being set at forty feet distance; but they grow taller and more upright in the forests, where I have beheld them, at eight and ten feet, shoot into very long poles; but neither so apt for timber nor fuel. The shade unpropitious to corn and grass, but sweet and, of all the rest, most refreshing to the

NOTES.

of all Nurserymen, who constantly raise their forest-trees upon good land. However, let this be remarked, that the best-rooted plants are always produced upon the best land—and in all kinds of planting a good root is an essential consideration. Upon the whole, the best, and least expensive method, is to raise plantations of this tree by sowing the mast where the plants are to remain, agreeable to the general idea given in chap. iii. book i. When raised in this manner, they will not sustain the inconveniences arising from the change of soil and situation.

Virgil feelingly describes the cooling shade of the Beech, in well known verses.

Tityre, tu patulæ recubans sub tegmine fagi.

Sylvestrem tenui musam meditaris avena.

ECL. i.

Tantum inter densas, umbrosa cacumina, fagos.

Affiduè veniebat. —————

ECL. ii.

The antient shepherds frequently carved their love verses upon the green bark of this tree, which was no bad substitute for the Egyptian papyrus.

Immo hæc, in viridi nuper quæ cortice fagi

Carmina descripsi, et modulans alterna notavi.

Experiar. —————

ECL. v.

They also wrote upon the bark of the *living* tree, and as the letters must have been of a large size, and cut deep, we may reasonably suppose that they seldom went much farther than the name of their mistress with a few tender epithets.

Certum est in Sylvis, inter Spelæa ferarum,

Malle pati, tenerisque meos incidere amores.

Arboribus: crescent illæ, crescetis amores.

ECL. x.

The same beautiful thought is preserved in the epistle of Ænone to Paris.

Incise servant a te mea nomina fagi:

Et legor Ænone falce notata tua.

Et quantum trunci, tantum mea nomina crescent:

Crescite, et in titulos surgite recta meos.

OID.

This custom of carving favourite names upon the bark of trees, seems to have derived its origin from the simplicity of nature, and consequently must have been common

weary shepherd—*lentus in umbra*, echoing Amaryllis with his oaten pipe. Mabillon tells us, in his *Itinerary*, of the old Beech at Villambrosa to be still flourishing, and greener than any of the rest, under whose umbrage the famous Eremit Gualbertus had his cell. CHAP. V.

This tree, planted in pallisade, affords an useful and pleasant skreen to shelter Orange and other tender case-trees from the parching sun, &c. growing very tall, and little inferior to the Horn-beam, or Dutch Elm. In the vallies, where they stand warm and in comfort, they will grow to a stupendous procerity, though the soil be stony and very barren; also upon the declivities, sides, and tops of high hills, and chalky mountains especially; for, though they thrust not down such deep and numerous roots as the Oak, and grow to vast trees, they will strangely insinuate their roots into the bowels of those seemingly impenetrable places, not much unlike the Fir itself, which, with this so common tree, the great Cæsar denies to be found in Britain, "*materia cujusque generis, ut in Gallia, præter Fagum & Abietem*;" but certainly from a grand mistake, or rather, for that he had not travelled much up into the country*. Virgil reports it will graff with the chefnut.

NOTES.

to all ages. Shakspeare says, "A man haunts the forest that abuses our young trees with carving *Rosalind* upon their bark."

Beechen bowls, curiously carved, were much prized by the antient shepherds. Menalcas, in his dispute with Dametas, speaks highly in praise of his two beechen bowls, considering them as superior in value to Dametas's young cow.

————— pocula ponam
Fagina, cælatum divini opus Alcimedontis.

ECL. iii.

Pliny relates that beechen vessels were employed in religious ceremonies; but in general they were considered as the furniture of the meanest people.

Terra rubens crater, pocula fagus erant.

OVID.

* From every evidence that can be had of former times, and from the evidence of our own eyes, we must suppose the Fir to be an indigenous tree. The quantity of this kind of wood, discovered in many bogs of this Island, leaves the matter beyond a doubt: But, with regard to what Cæsar says of the Beech, the argument against him is not so conclusive. The ingenious Mr. Haisted, in the xix. number of the 61st vol. of Phil. Transf. speaking of Cæsar's observation, says, "both of which (the *Fir* and "*Beech*) were in the greatest plenty here at that very time; the latter was particularly "so in the county of Kent, the only place he might be said to be acquainted with." But for this Mr. Haisted quotes no authorities.

Book I.

2. The Beech serves for various uses of the housewife.

Hinc olim juvenis mundi melioribus annis,
 Fortunatarum domuum non magna supellex.
 Tota petebatur; fellas, armaria, lectos,
 Et menfas dabat, & lances, & pocula Fagus. COULEIUS.

Hence, in the world's best years, the humble shed
 Was happily and fully furnished:
 Beech made their chests, their beds, and the join'd-stools;
 Beech made the board, the platters, and the bowls.

With it the turner makes dishes, trays, rims for buckets, trenchers, dresser-boards, and other utensils. It serves the wheeler and joiner for large screws, &c. The upholsterer uses it for sellies, chairs, bedsteads, &c. It makes shovels and spade-graffs for the husbandman, and is useful to the bellows-maker. Floats for fishers' nets, instead of corks, are made of its bark. It is good for fuel, billet, bayon, and coals, tho' one of the least lasting; and its very shavings are good for fining of wine. Peter Crescentius writes, that the ashes of Beech, with proper mixture, is excellent to make glass with. If the timber lie altogether under water, 'tis little inferior to Elm, as I find it practised and asserted by shipwrights. Of old they made their Vasa Vindemiatoria and Corbes Messoriae, as we our pots for strawberries, with the rind of this tree; nay, and vessels to preserve wine in; and that curiously wrought cup, which the shepherd, in the Bucolics, wagers withal, was engraven by Alcimedon upon the bark of the Beech. And an happy age it seems.

————— Nec bella fuerunt,
 Faginus adstabat cum scyphus ante dapes. TIBUL.

————— No wars did men molest,
 When only beechen bowls were in request.

Of the thin lamina, or scale of this wood, as our cutlers call it, are made scabbards for swords, and band-boxes, superinduced with thin leather or paper; boxes for writings, hat-cases, and formerly book-covers. I wonder we cannot split it ourselves, but send it into other countries for such trifles. In the cavities of these trees, bees much delight to hive them-

selves: Yet for all this, you would not wonder to hear me deplore the so frequent use of this wood, if you did consider that the industry of France furnishes that country for all domestic utensils with excellent Walnut, a material infinitely preferable to the best Beech, which is indeed good only for shade, and for the fire, as being brittle, and exceedingly obnoxious to the worm, where it lies either dry, or wet and dry, as has been noted; but, being put ten days in water, it will exceedingly resist the worm. To which, as I said, it is so obnoxious, that I wish the use of it were, by a law, prohibited all joiners, cabinet-makers, and such as furnish tables, chairs, bedsteads, coffers, screws, &c. They have a way to black and polish it, so as to render it like Ebony; and, with a mixture of foot and urine, imitate the Walnut; but as the colour does not last, so neither does the wood itself, for I can hardly call it timber, soon after the worm has seized it, unless one sponge and imbibe it well with the oil of spike, where they have made holes: Ricciolus, indeed, much commends it for oars; and some say, that the vast Argo was built of the Fagus, a good part of it at least, as we learn out of Apollonius: This will admit of interpretation. The Fagus yet, by Claudian, is mentioned with the Alder.

*Sic qui vecturus longinqua per æquora merces
Molitur tellure ratem, vitæque procellis
Objectare parat, Fagos metitur, & Alnos,
Et varium rudibus silvis accommodat usum.*

So he, that to export o'er sea his wares;
A vessel builds, and to expose, prepares
His life to storms, first Beech and Alder cuts;
And, measuring them, to various uses puts.

But, whilst we thus condemn the timber, we must not omit to praise the mast, which fats our swine and deer; and hath, in some families, even supported men with bread. Chios endured a memorable siege by the benefit of this mast. And, in some parts of France, they now grind the buck in mills; it affords a sweet oil, which the poor people eat most willingly. But there is yet another benefit which this tree presents us; that its very leaves, which make a natural and most agreeable canopy all the summer, being gathered about the fall, and somewhat before they are much frost-bitten, afford the best and easiest mattresses in the world, to lay

Book 1. under our quilts instead of straw; because, besides their tenderness and loose lying together, they continue sweet for seven or eight years long, before which straw becomes musty and hard: They are are thus used by divers persons of quality in Dauphine; and, in Switzerland, I have sometimes lain on them to my great refreshment: So as, of this tree, it may properly be said,

——— *Silva domus, cubilia frondes.* JUVENAL.

The wood's an house, the leaves a bed.

Being pruned, it heals the scar immediately, and is not apt to put forth so soon again as other trees.

The stagnate water in the hollow trees cures the most obstinate tetters, scabs, and scurfs in man or beast, fomenting the part with it: The leaves, chewed, are wholesome for the gums and teeth; and the very buds, as they are in winter hardened and dried upon the twigs, make good tooth-pickers. Swine may be driven to mast about the end of August; but it is observed, that, where they feed on it before it be mature, it intoxicates them for a while; and that, generally, their fat is not so good and solid, but drips away too soon. In the mean time, the kernels of the mast are greedily devoured by squirrels, mice, and, above all, the dormice, who, harbouring in the hollow trees, grow so fat, that, in some countries abroad, they take infinite numbers of them, I suppose, to eat: And what relief they give to thrushes, black-birds, fieldfares, and other birds, every body knows.



The Hornbeam Tree.

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C H A P. VI.

CHAP. VI.

The HORN-BEAM*.

1. **O**STRYS, the Horn-beam. This, by some, is called the Horse-beech, from the resemblance of the leaf, and in Latin (ignorantly) the Carpinus. It is planted of sets, though it may likewise be raised from the seeds, which, being mature in August, should be sown in October; these lie a year in the bed, which must be well and carefully shaded so soon as they peep. But the more expeditious way is by layers or sets of about an inch diameter, and cut within half a foot of the earth: Thus it will advance to a considerable tree. The places it chiefly desires to grow in, are cold hills, stiff ground, and the barren and most exposed parts of woods. We have it no where more abounding, in the south, than in the woods of Hertfordshire; very few westward.

2. Amongst other uses, it serves for mill-cogs, for which it excels either Yew or Crab; yolk-timber, whence of old, and that it was as well

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* Of this genus there are four species.

1. *CARPINUS (Vulgaris) squamis-strobilorum planis.* Hort. Cliff. 447. *Horn-beam with flat scales to the cones.* Carpinus, Pemp. Dod. 841. *Common Horn-beam.*

This sort is very common in many parts of England, but is rarely suffered to grow as a timber tree, being generally pollarded by the country people; yet, where the young trees have been properly treated, they have grown to a large size. I have seen some of them in woods, upon a cold stiff clay, that have been near seventy feet high, with large, noble, fine stems, perfectly straight and sound. Of late years, this has only been considered as a shrub, and seldom cultivated but for underwood in the country, and for hedges in the nurseries, after the French taste; for in most of their great gardens, their cabinets, &c. are formed of these trees, as are their trellises and hedges which surround their plantations. But, since these ornaments have been banished from the English gardens, there has been little demand for it in our nurseries. As the Horn-beam will thrive upon cold, barren, and exposed hills, and in such situations where few other trees will grow, it may be cultivated to advantage by the proprietors of such lands. It will resist the violence of winds better than most other trees, and is by no means slow in its growth. But where it is propagated for timber, it should be raised from seeds, upon the same soil, and in the same situation where it is designed to grow; and not be brought from very rich land, and a warm exposure. The seeds should be sown in the autumn, soon after they are ripe; for, if they are kept out of the ground till the

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flexible as tough, it was called *ζυγία*; heads of beetles, stocks and handles of tools. It is likewise, for the turner's use, excellent. It makes good fire-wood, where it burns like a candle; and was of old so employed:

Carpinus tædas fissa facesque dabit.

Being planted in small fosses or trenches, at half a foot interval, and in the single row, it makes the noblest and stateliest hedge for long walks in

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Spring, the plants will not come up till the following year. When the plants appear, they must be kept clear from weeds, and treated as other forest-trees. In two years they will be fit to transplant; for the sooner all trees that are designed for timber are planted where they are to remain, the larger they will grow, and the wood will be firmer and more durable. When these are not intermixed with other trees, they should be planted close, especially on the outside of the plantations, that they may protect and draw each other up; and if they are kept clean from weeds for three or four years, it will greatly promote their growth; after which the plants will need no further assistance in that particular. As the trees advance in growth, they should be thinned, which must be done with caution, cutting away the most unpromising plants gradually, so as not to let in too much cold air, at once, upon those that are left, especially on the borders of the plantation. For, in all young plantations of timber, it is much better to take away a few trees every year, than, as is too often practised, to permit all to grow till they are fit to be cut as under-wood, when a few trees are left for timber. By this injudicious practice, so much cold air is suddenly let in upon the timber trees, that their growth is retarded for some years. The leaves of the Horn-beam remain upon the branches till the young buds push them off in the spring, which renders them proper to plant round the borders of other plantations in exposed situations; where they will defend the other trees in winter, and thereby promote their growth.

2. *CARPINUS (Ostrya) squamis strobilorum inflatis.* Hort. Cliff. 447. *Horn-beam with inflated scales to the cones.* *Ostrya ulmo similis, fructu racemoso lupulo simili.* Bauh. Pin. 427. *The Hop Horn-beam.*

This kind sheds its leaves, in winter, with the Elm and other deciduous trees: Though but lately known in this country, it is very common in Germany, growing promiscuously with the common sort. The Hop Horn-beam is of quicker growth than the common kind; but the goodness of the timber is not yet known, there being but few of these trees growing in England upon their own roots, most of them having been grafted upon the common Horn-beam, the usual method of propagating them in our nurseries. But the trees, so raised, are of short duration; for the graft generally grows much faster than the stock, so that

gardens or parks, of any tree whatsoever whose leaves are deciduous, and forsake their branches in winter, because it grows tall, and so sturdy as not to be wronged by the winds; besides, it will furnish to the very foot of the stem, and flourishes with a glossy and polished verdure, which is exceeding delightful, of long continuance, and, of all other the harder woods, the speediest grower, maintaining a slender upright stem, which does not come to be bare and sticky in many years. It has yet this (shall I call it) infirmity, that, keeping on its leaves till new ones thrust them off, it is clad in russet all the winter long. That admirable espalier-hedge in the long middle walk of the Luxemburgh garden at Paris, than which there is nothing more graceful, is planted of this tree; and so was that cradle, or close-walk, with that perplexed canopy which lately covered the seat in his Majesty's garden at

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in a few years there is a great disproportion in their size; and where they happen to stand exposed to strong winds, the graft is frequently broken from the stock, after many years growth.

3. *CARPINUS (Orientalis) foliis ovato-lanceolatis serratis strobilis brevibus. Horn-beam with oval, spear-shaped, sawed leaves, and the shortest cones. Carpinus orientalis folio minori, fructu brevi. T. Cor. 40. Eastern Horn-beam, with a smaller leaf and shorter fruit.*

This tree is of humble growth, rarely rising, in this country, above ten or twelve feet in height. As it shoots out many horizontal, irregular branches, it cannot be trained up to a stem. The leaves are much smaller than those of the common Horn-beam, and the branches grow closer together, which qualifies it for low hedges, where such are wanted in gardens. Being a very tonfille plant, it may be kept in less compass than almost any deciduous tree. It is as hardy as any of the other sorts; but, at present, it is rare in our nurseries.

4. *CARPINUS (Virginiana) foliis lanceolatis acuminatis, strobilis longissimis. Horn-beam with pointed, spear-shaped leaves, and the longest cones. Carpinus Virginiana florefcens. Pluk. Virginian flowering Horn-beam.*

This sort grows to the height of thirty feet, and is of quicker growth than either of the former kinds. It sheds its leaves in autumn, about the same time with the Elm. During the time of its verdure it makes a good appearance, being clothed with leaves of a deep, strong, green colour, resembling the long-leaved Elm more than the Horn-beam.

The Horn-beam, in the Linnæan system, is ranked in the class and order Monœcia Polyandria, which comprehends such plants as have male and female flowers on the same plant, the male flowers having numerous stamina. The leaves begin to open about

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Hampton-court; and, as now I hear, they are planted in perfection at New-park, the delicious villa of the noble Earl of Rochester, belonging once to a near kinsman of mine, who parted with it to King Charles the First of blessed memory. These hedges are tonfile; but, where they are maintained to fifteen or twenty feet height, which is very frequent in the places before mentioned, they are to be cut, and kept in order with a fythe of four feet long, and very little falcated; this is fixed on a long sneed, or straight handle, and does wonderfully expedite the trimming of these and the like hedges. An oblong square, palifadoed with this plant, or the Flemish Ormus, as is that I am going to describe, and may be seen

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the latter end of March, and are quite out by the middle of April; and the flowers are in full bloom towards the end of that month.

All these sorts of Horn-beams, the first excepted, should be propagated by layers; for which purpose a few plants should be procured for stools; those, for the Eastern Horn-beam, should be planted a yard asunder, and the others about two yards. After the plants have made some young shoots, they should be layered in the autumn, and by that time twelvemonth they will have struck root; at which time, or early in the spring, they should be taken off and planted in the nursery, observing to brush up the stools, that they may afford young shoots to be layered the succeeding autumn.

In Westphalia, and other parts of North Germany, the Horn-beam is in great repute. There they make a hedge of it which answers Columella's description of a good fence:

—— Neu fit pecori, neu pervia furi.

DE HORT.

When the German husbandman erects a fence of Horn-beam, he throws up a parapet of earth, with a ditch on each side, and plants his sets (raised from layers) in such a manner, as that every two plants may be brought to intersect each other in the form of a St. Andrew's cross. In that part where the two plants cross each other, he scrapes off the bark, and binds them closely together with straw. In consequence of this operation, the two plants consolidate in a sort of indissoluble knot, and push from thence horizontal, slanting shoots, which form a living palisado, or *chevaux de frise*; so that such a protection may be called a rural fortification. These hedges, being pruned annually, and with discretion, will, in a few years, render the fence impenetrable in every part. It is not uncommon in Germany to see the sides of high roads thus guarded for many miles together; and it were to be wished that this example was followed in some places of this kingdom. I am the more inclined to recommend such hedges, as the Horn-beam is not delicate in point of soil, but will even thrive on land seemingly barren. When properly pruned, it will put out strong lateral shoots, within three inches of the ground, by which means it makes an impenetrable fence against cattle. It is also of quick growth; a thing of great consequence in the improvement of waste land.

in that inexhaustible magazine at Brompton-park, (cultivated by those two industrious fellow-gardeners, Mr. London and Mr. Wise) affords such an *umbraculum frondium*, the most natural, proper station, and convenience for the protection of our Orange trees, Myrtles, and other rare Perennials and Exoticks, from the scorching darts of the sun, and heat of summer; placing the cases, pots, &c. under this shelter, when, either at the first peeping out of the winter conclave, or during the increasing heat of summer, they so are ranged and disposed, as to adorn a noble area of a most magnificent paradisiac dining-room, to the top of Hortulan pomp and bliss, superior to all the artificial furniture of the greatest prince's court. Here the Indian Narcissus, Tuberoses, Japan-Lillies, Jasmynes, Jonquills, Periclymena, Roses, Carnations, with all the pride of the parterre, intermixt between the tree-cases, flowry vases, busts, and statues, entertain the eye, and breathe their redolent odours and perfumes to the smell. The golden fruit, the apples of the Hesperides, together with the delicious ananas gratify the taste, whilst the cheerful ditties of canorous birds recording their innocent amours to the murmurs of the bubbling fountain, delight the ear. At the same time the charming accents of the fair and virtuous sex, preferable to all the admired compositions of the most skilful musicians, join in concert with hymns and hallelujahs to the bountiful and glorious Creator, who has left none of the senses which he has not gratified at once with their most agreeable and proper objects.

But, to return to Brompton: It is not to be imagined what a surprising scene such a spacious saloon, tapistried with the natural verdure of the glittering foliage, presents the spectator, and recompenses the toil of the ingenious planter; when, after a little patience, he finds the slender plants (set but at five or six feet distance, nor much more in height, well pruned and dressed) ascend to an altitude sufficient to shade and defend his paradisiac treasure, without excluding the milder gleams of the glorious and radiant planet with his cherishing influence and kindly warmth to all within the inclosure—refreshed with the cooling and early dew pregnant with the sweet exhalations, which the indulgent mother and teeming earth sends up to nourish and maintain her numerous and tender offspring.

But, after all, let us not dwell here too long, whilst the inferences to be derived from those tempting and temporary objects, prompt us to raise

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our contemplations a little on objects yet more worthy our noblest speculations and all our pains and curiosity, representing that happy state above, namely, the celestial paradise: Let us, I say, suspend our admiration a while of these terrestrial gaieties, which are of so short continuance, and raise our thoughts from being too deeply immersed and rooted in them, aspiring after those supernal, more lasting, and glorious abodes; namely, a paradise, not like this of ours, with so much pains and curiosity, made with hands, but eternal in the heavens, where all the trees are trees of life, the flowers all Amaranths; all the plants perennial, ever verdant, ever pregnant; and where those who desire knowledge may fully satiate themselves; taste freely of the fruit of that tree which cost the first gardener and posterity so dear; and where the most voluptuous inclinations to the allurements of the senses may take and eat, and still be innocent; no forbidden fruit; no serpent to deceive; none to be deceived.

Hail! O hail, then, and welcome, you blessed Elysiums, where a new state of things expects us; where all the pompous and charming delights that detain us here a while, shall be changed into real and substantial fruitions, eternal springs, and pleasure intellectual, becoming the dignity of our nature!

I beg no pardon for the application, but deplore my no better use of it; and that, whilst I am thus upon the wing, I must now descend so soon again.

Of all the foresters, the Horn-beam preserves itself best from the brutishness of deer, and therefore to be kindly entertained in parks. But the reason why, with us, we rarely find it ample and spreading, is, that our husbandman suffers too large and grown a lop before he cuts them off; which leaves such ghastly wounds, as often prove exitial to the tree, or cause it to grow deformed and hollow, and of little worth but for the fire; whereas, were they oftener taken off when the lops were younger, though they did not furnish so great wood, yet the continuance, and flourishing of the tree, would more than recompence it. For this cause,

3. They very frequently plant a clump of these trees before the entries of most of the great towns in Germany, to which they apply timber-frames for convenience of the people to sit and solace in. Scamozzi, the Architect, says, "That in his time he found one whose branches extended

seventy feet in breadth;" this was at Vuimfen, near the Necker, belonging to the Duke of Wirtemberg: but that which I find planted before the gates of Strasburgh is a Platanus and a Lime-tree growing hard by one another, in which is erected a Pergola of fifty feet wide, and eight feet from the ground, having ten arches of twelve feet height, all shaded with their foliage; besides this there is an over-grown Oak which has an arbour in it of sixty feet diameter.

C H A P. VII.

The ASH *.

Book I.

1. **F**RAXINUS, the Ash. This tree with us is reputed male and female, the one affecting the higher grounds, the other the plains, of a whiter wood, and rising many times to a prodigious stature, so as in forty years from the key, an Ash hath been sold for thirty pounds sterling. And I have been credibly informed, that one person hath planted so much of this one sort of timber in his life-time, as hath been valued worth fifty thousand pounds to be bought. These are pretty encouragements for a small and pleasant industry. That there is a lower and more knotty sort, every husbandman can distinguish.

The keys, or tongues, being gathered from a young thriving tree when they begin to fall, (which is about the end of October, and the ensuing month) are to be laid to dry, and then sowed any time betwixt that and Christmas; but not altogether so deep as your former masts. Thus they

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* Of this genus Mr. Miller enumerates six species; but properly there are only three.

1. **FRAXINUS** (*Excelsior*) foliolis serratis, floribus apetalis. Lin. Sp. Plant. 1509. *Ash-tree whose smaller leaves are serrated, and flowers having no petals.* Fraxinus excelsior. C. B. P. 416. *The common Ash.*

This is the common Ash-tree which grows naturally in most parts of England, and is so well known as to need no description. The leaves of this sort have generally five pair of lobes, and are terminated by an odd one; they are of a very dark green, and their edges are slightly sawed. The flowers are produced in loose spikes from the side of the branches, which are succeeded by flat seeds, which ripen in autumn: there is a variety of this with variegated leaves, which is preserved in some gardens.

2. **FRAXINUS** (*Rotundifolia*) foliolis ovato-lanceolatis serratis, floribus corollatis. *Ash-tree whose smaller leaves are oval, spear-shaped, and sawed, and flowers having petals.* Fraxinus rotundior folio. C. B. P. 416. *Ash-tree with a rounder leaf, commonly called Manna Ash.*

This sort grows naturally in Calabria, and is generally supposed to be the tree from whence the manna is collected, which is an exudation from the leaves of the tree. The shoots of this tree are much shorter, and the joints closer together than those of the first sort; the small leaves are shorter, and deeper sawed on their edges,



The common Ash Tree.

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J. Miller del & Sculp.

do in Spain, from whence it were good to procure some of the keys from their best trees. A very narrow seminary will be sufficient to store a whole country; they will lie a full year in the ground before they appear, therefore you must carefully fence them all that time, and have patience; but if you would make a considerable wood of them at once, dig or plow a parcel of ground, as you would prepare it for corn, and with the corn, especially oats, (or what other grain you think fittest) sow also good store of keys, some Crab-kernels, &c. amongst them. Take off your crop of corn or seed in its season, and the next year following it will be covered with young Ashes, which will be fit either to stand, which I prefer, or be transplanted for divers years after; and these you will find to be far better than any you can gather out of the woods (especially suckers which are worth nothing) being removed at one foot stature, the sooner the better; for Ashes of two years thus taken out of the nursery, shall outstrip those

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and are of a lighter green. The flowers come out from the side of the branches, which are of a purple colour, and appear in the spring before the leave comes out. This tree is of humble growth, seldom rising more than fifteen or sixteen feet high in England.

3. *FRAXINUS (Ornus) foliolis ferratis, floribus corollatis.* Lin. Sp. Plant. 1057. *Ash-tree whose smaller leaves are sawed, and flowers having petals.* *Fraxinus humilior* five altera Theophrasti, minore & tenuiore folio. C. B. P. 416. *Dwarf Ash of Theophrastus with smaller and narrower leaves.*

This is a low tree, which rises about the same height as the second; the leaves are much smaller and narrower than those of the first, but are sawed on their edges, and are of the same dark colour. The flowers of this sort have petals, which are wanting in the common Ash.

4. *FRAXINUS (Paniculata) foliolis lanceolatis glabris, floribus paniculatis terminaticibus.* *Ash-tree with smooth spear-shaped leaves and flowers growing in panicles at the ends of the branches.* *Fraxinus florifera botryoides.* Mor. Præl. 265. *The flowering Ash.*

This sort was raised by the late Dr. Uvedale at Enfield, from seeds which were brought from Italy by Dr. William Sherard, where the trees grow naturally; it was supposed to be a different sort from that mentioned by Dr. Morison, in his *Praeludia Botanica*, but by comparing them together they appear to be the same. The leaves have but three or four pair of lobes, (or small leaves) which are short, broad, and smooth, of a lucid green, and irregularly sawed on the edges; the midrib of the great leaf is jointed, and swells where the leaves come out. The flowers grow in loose panicles at the end of the branches: these are most of them

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of ten taken out of the hedge, provided you defend them well from cattle, which are exceedingly liquorish after their tops: The reason of this hasty transplanting, is to prevent their obstinate and deep rooting, *tantus amor terre*—which makes them hard to be taken up when they grow older, and that being removed, they take no great hold till the second year, after which they come away amain; yet I have planted them of five and six inches diameter, which have thriven as well as the smaller wands. You may accelerate their springing by laying the keys in sand, and some moist fine earth, stratum super stratum; but lay them not too thick, or double,

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male, having two stamina in each, but no germen or style; they are of a white herbaceous colour, and appear in May. As this sort very rarely produces seeds in England, it is propagated by grafting or budding upon the common Ash.

5. *FRAXINUS* (*Nov. Angl.*) foliolis integerrimis, petiolis teretibus. Flor. Virg. 122. *Ash-tree with the small leaves entire, and taper foot-stalks.* Fraxinus ex Novâ Angliâ, pinnis foliorum in mucronem productioribus. Rand. Cat. Hort. Chelf. *New England Ash with long acute points to the wings of the leaves.*

This was raised from seeds, which were sent from New-England in the year 1724, by Mr. Moore. The leaves of this tree have but three, or at most but four pair of lobes, (or small leaves) which are placed far distant from each other, and are terminated by an odd lobe, which runs out into a very long point; they are of a light green and entire, having no serratures on their edges; this tree shoots into strong irregular branches, but doth not grow to a large size in the trunk. It is propagated by grafting or budding upon the common Ash.

6. *FRAXINUS* (*Caroliniana*) foliolis integerrimis, petiolis teretibus, fructu latiore. Prod. Leyd. 533. *Ash-tree with entire leaves and taper foot-stalks.* Fraxinus Caroliniana, latiore fructu. Rand. Cat. H. Chelf. *Carolina Ash with a broad fruit.*

This last sort was raised from seeds which were sent from Carolina in the year 1724, by Mr. Catesby. The leaves have seldom more than three pair of lobes, the lower being the least, and the upper the largest; these are about five inches long and two broad, of a light green colour, and slightly sawed on their edges; the foot-stalk, or rather the midrib, of the leaves is taper, and has short downy hairs; the seeds are broader than those of the common Ash, and are of a very light colour. As this sort hath not yet produced seeds in England, it is propagated by grafting or budding upon the common Ash.

This genus of plants, in the Linnæan system, is ranked in the class and order Polygamia Dioecia, the Polygamy being upon two distinct plants.

The curious observer of nature will find the flowers of the Ash begin to open about the sixteenth of April, and about the twenty-second they will be in full blow. The

and in a covered, though airy place for a winter, before you sow them; and the second year they will come away mainly, so you weed, trim, and cleanse them. Cut not his head at all, (which being young is pithy) nor by any means the fibrous part of the roots, only that down-right or tap-root (which gives our husbandmen so much trouble in drawing) is to be totally abated: But this work ought to be in the increase of October or November, and not in the spring. We are, as I told you, willing to spare his head rather than the side branches, (which, whilst young, may be cut close) because being yet young, it is but of a spongy substance, but

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leaves, also, of some of these trees growing in favourable situations, will, by this time, be out; though others will not shew their foliage till the middle of May.

The common Ash is easily propagated from the keys, for which consult the directions given in page 44. The foreign kinds may also be raised from seeds, when they can be procured from abroad: Budding, however, is the general method; so that those who have not a correspondence in the countries where they grow naturally, should procure a plant or two of a sort, and should raise young Ashes of the common sort for stocks. These stocks should be planted out in the nursery, a foot asunder, and two feet distant in the rows. When they are one year old, and grown to be about the thickness of a bean-straw, they will be of a proper size for working. A little after Midsummer is the time for the operation; and care must be observed not to bind the eye too tight. They need not be unloosed before the latter end of September. In March, the head of the stock should be taken off a little above the eye; and, by the end of the summer following, if the land be good, they will have made surprizing strong shoots, many of them six feet or more.

The timber of the Ash (the Oak only excepted) serves for the greatest variety of uses of any tree in the forest. Tho' a handsome tree, it ought by no means to be planted for ornament in places designed to be kept neat, because the leaves fall off, with their long stalks, very early in the autumn, and by their litter destroy the beauty of such places. But although it is not well adapted to plant near gravel-walks and pleasure-grounds, it is not only proper for woods, but also to form clumps in large parks, or it may be set out for standards; but it should never be planted on the borders of tillage land, because the dripping of the leaves is extremely prejudicial to corn, and the roots have a powerful tendency to draw the nourishment from the ground. Neither should it be planted near pasture ground, for if the cows eat the leaves or shoots, the butter will become rank and of small value; and it is remarked that butter made about Guildford, Godalmin, and some other parts of Surry, where Ash-trees grow in almost all the pastures, is seldom good. In all good dairy-farms an Ash-tree is never permitted to grow, except in woods.

A wood of these trees, rightly managed, will produce considerable advantages to the owner; for by the underwood, which will be fit to cut every fourteen or fifteen years

Book 1. being once well fixed, you may cut him as close to the earth as you please; it will cause him to shoot prodigiously, so as in a few years to be fit for pike-staves; whereas if you take him wild out of the forest, you must of necessity strike off the head, which much impairs him. Hedge-row Ashes may the oftener be decapitated, and will shew their heads again sooner than other trees so used. Young Ashes are sometimes in winter frost-burnt, black as coals, and then to use the knife is seasonable, though they do commonly recover of themselves slowly. In South Spain, (where, as we said, are the best) after the first dressing they let them grow till they are so big, as being cleft into four parts, each part is sufficient to make a pike-staff: I am told there is a Flemish Ash, planted by the Dutchmen in Lincolnshire, which in six years grows to be worth twenty shillings the

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for hop-poles, &c. there will be a regular income superior to the rent of the neighbouring lands, and still there will be a stock left for timber, which, like an estate in reversion, will, at some future period, pour in considerable riches.

As the quickness of growth will depend upon the goodness of soil, the number of years from the first planting to the first fall, will vary accordingly; though, if the wood be large, I would advise to have the first fall of poles very soon, that there may be an annual sale till the wood has been wholly cut down; and this should be so contrived, that the year after the last quarter is cut, that which was first begun on may be ready for a second falling. This will happen at an interval of about fifteen or twenty years, by which time the poles will be large; but if they are wanted for smaller purposes, the fall should be proportionably sooner.

After the first fall, great care should be taken to grub up the worst stools where they are too thick; for now every stool will send out four or five branches. But before any are grubbed up, a proper number should be pitched on to grow to timber; and these should always be such trees as are the largest, most healthy, and thriving.

The Ash will grow exceeding well upon almost any soil; and the best time for selling the timber is in the winter months, from November to February; for if it be cut later, it is not only subject to a worm which greatly damages the timber, but the bark will divide from the stools, to their great detriment.

It is observable, that Pollards should always be lopped in the spring; and it is farther to be remarked of these, that when the head of a Pollard begins to be hollow, the body then enters upon a state of decay; so that if this is designed to be useful, the Pollard should be then wholly cut down.

Pollards are of great service where fuel is scarce; a few of these trees will turn out many loads of lop, and the wood of them makes the sweetest of all fires, and will burn well either green or dry.

One caution more let me give with respect to these trees: Do not let the interval between their lopping be too great: If the branches be suffered to grow to a very great thickness, the taking them off will proportionably injure the tree.

tree; but I am not assured whether it be the Ash or Abele; either of them were, upon this account, a worthy encouragement, if at least the latter can be thought to bear that price, which I much question: From these low cuttings come our Ground-Ashes, so much sought after for arbours, espaliers, and other pole-works: they will spring in abundance, and may be reduced to one for a standard tree, or for timber, if you design it; for thus, Hydra like, a ground-cut Ash

Per damna, per cædes, ab ipso
Ducit opes animumque ferro.

HOR.

By havock, wounds, and blows,
More lively and luxuriant grows.

Ash may be propagated from a bough split off with some of the old wood a little before the bud swells, but with difficulty by layers. Such as they reserve for spears in Spain, they keep shriped up close to the stem, and plant them in close order, and moister places. These they cut above the knot (for the least nodosity spoils all) in the decrease of January, which were of the latest for us. It is reported that the Ash will not only receive its own kind, but graft, or be inoculated, with the Pear and Apple; but to what improvement I know not.

3. It is by no means convenient to plant Ash in plow-lands, for the roots will be obnoxious to the coulter; and the shade of the tree is malignant both to corn and grass, when the head and branches over-drip and emaciate them; but in hedge-rows and plumps, they will thrive exceedingly, where they may be disposed at nine or ten feet distance, and sometimes nearer: But in planting of a whole wood of several kinds of trees for timber, every third set at least should be an Ash. The best Ash delights in the best land, which it will soon impoverish, yet grows in any, so it be not over stiff, wet, and approaching to the marshy, unless it be first well drained: By the banks of sweet and crystal rivers and streams I have observed them to thrive infinitely. One may observe as manifest a difference in the timber of Ashes as of the Oak, much more than is found in any one kind of Elm, *ceteris paribus*; for so the Ground-Ash, like the Oak, much excels a bough or branch of the same bulk for strength and toughness; and in yet farther emulation of the Oak, it has been known to prove as good and lasting timber for building, nay, preferred before it,

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where there has been plenty of Oak; vast difference there is also in the strength of ground and quartered Ash. It is likewise remarkable that the Ash, like the Cork-tree, grows when the bark is as it were quite peeled off, as has been observed in several forests, where the deer have bared them as far as they could climb. Some Ash is curiously camleted and veined, I say, so differently from other timber, that our skilful cabinet-makers prize it equal with Ebony, and give it the name of Green Ebony, which their customers pay well for; and when our wood-men light upon it, they may make what money they will of it: But to bring it to that curious lustre, so as 'tis hardly to be distinguished from the most curiously diapered Olive, they varnish their work with the China Varnish, hereafter described, which infinitely excels linseed oil, that Cardan so commends, speaking of this root. The truth is, the *Bruscum*, or *Molluscum*, to be frequently found in this wood, is nothing inferior to that of Maple, (of which hereafter) being altogether as exquisitely diapered, and waved like the Gamahes of Achates. Dr. Plott speaks of an eminent example of divers strange figures of fish, men, and beasts to be found in a dining-table made of an old Ash, standing in a Gentleman's house somewhere in Oxfordshire; upon which is mentioned that of Jacobus Gafferellus, in his book of Unheard-of Curiosities, namely, of a tree found in Holland, which being cleft, had, in several slivers, the figures of a chalice, a priest's albe, his stole, and several other pontifical vestments; of this sort was the Elm growing at Middle-Aston in Oxfordshire, a block of which wood being cleft, there came out a piece so exactly resembling a shoulder of veal, that it was worthy to be reckoned among the curiosities of this nature.

4. The use of Ash is (next to that of the Oak itself) one of the most universal: It serves the soldier—& *Fraxinus utilis hastis*—and heretofore the scholar, who made use of the inner bark to write on, before the invention of paper. The carpenter, wheel-wright, and cart-wright find it excellent for plows, axle-trees, wheel-rings, harrows, bulls; it makes good oars, blocks for pulleys and sheffs, as seamen name them: For drying herrings no wood is like it, and the bark is good for the tanning of nets; and like the Elm, for the same property, (of not being so apt to split and scale) is excellent for tenons and mortises; also for the cooper, turner, and thatcher; nothing is like it for our garden palisade-hedges, hop-yards, poles and spars, handles and stocks for tools, spade-trees, &c. In sum, the husbandman cannot be without the Ash for his carts, ladders, and other tackling, from the pike to the plow, spear and bow; for of Ash were they

formerly made, and therefore reckoned amongst those woods which, after long tension, has a natural spring, and recovers its position; so as in peace and war it is a wood in highest request: In short, so useful and profitable is this tree, next to the Oak, that every prudent Lord of a Manor should employ one acre of ground with Ash to every twenty acres of other land, since in as many years it would be more worth than the land itself. There is extracted an oil from the Ash, by the process on other woods, which is excellent to recover the hearing, some drops of it being distilled warm into the ears; and for the caries or rot of the bones, tooth-ach, pains in the kidneys and spleen, the anointing therewith is most sovereign*. Some have used the saw-dust of this wood, instead of guaiacum, with success. The chemists exceedingly commend the seed of Ash to be an admirable remedy for the stone; but whether by the power of magic or nature, I determine not. I have heard it affirmed with great confidence, and upon experience, that the rupture, to which many children are obnoxious, is healed, by passing the infant thro' a wide cleft made in the bole or stem of a growing Ash-tree; it is then carried a second time round the Ash, and caused to repass the same aperture as before. The rupture of the child being bound up, it is supposed to heal as the cleft of the tree closes and coalesces. The manna of Calabria is found to exude out of the leaves and boughs of this tree during the hot summer months†: Lastly, the white and rotten dotard part composes the ground for our Gallants sweet powder; and the trunchions

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* As Mr. Evelyn does not profess any knowledge in medicine, but on the contrary makes an apology for his ignorance, in the fifth page of this work; I shall only remark that the boasted properties of the oil obtained from the Ash are not to be depended on, being only in common with oil obtained from any other tree. The curing a ruptured child, by passing its body through a cleft made in the bole of a young Ash-tree, has no foundation in reason or philosophy.

† Upon the authority of Mr. Miller I mentioned the *Fraxinus (Rotundifolia)* as being the Ash from whence the manna was procured; but I am now better informed by Dr. Dominico Cirilli, that it is the *Fraxinus (Ornus)*. The Doctor, in a letter addressed to Dr. Watson, and inserted in the sixtieth vol. of the Philosoph. Trans. says, "The Manna-tree, commonly called *Ornus* by botanists, is a kind of Ash, and is to be found under the name of *Fraxinus Ornus* in Linnæus's Sp. Plant. In all the woods near Naples the Manna-tree is to be found very often, but for want of cultivation, it never produces any manna, and is rather a shrub than a tree. The manna is generally of two kinds, not on account of the intrinsic quality of them being different, but because they are got in a different manner. In order to have the manna, those who have the management of the woods of the Orni in the months of July and August,

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make the third sort of the most durable coal, and is, of all other, the sweetest of our forest fuelling, and the fittest for Ladies chambers; it will burn even whilst it is green, and may be reckoned amongst the *ἀκαπνα ξύλα*. To conclude: The very dead leaves afford, like those of the Elm, relief to our cattle in winter; and there is a dwarf sort in France, (if in truth it be not, as I suspect, our Witcher-tree) whose berries feed the poor people in scarce years; but it bears no keys like to ours, which, being pickled tender, afford a delicate sallading: But the shade of the Ash is not to be endured, because the leaves produce a noxious insect; and for displaying themselves so very late, and falling very early, not to be planted for umbrage or ornament, especially near the garden, since, besides their predacious roots, the leaves dropping with so long a stalk, are drawn by clusters into the worm-holes, which foul the alleys with their keys, and suddenly infect the ground. Note, that the season for felling of this tree must be when the sap is fully at rest; for if you cut it down too early, or over late in the year, it will be so obnoxious to the worm, as greatly to prejudice the timber; therefore to be sure, fell not but in the three mid-winter months, beginning about November. But in lopping of Pollards, as of soft woods, Mr. Cook advises it should be towards the spring, and that you do not suffer the lops to grow too great; also, that so soon as a Pollard comes to be considerably hollow at the head, you suddenly cut it down, the body decaying more than the head is worth: The same he pronounces of taller Ashes, and where the wood-peckers make holes (who constantly indicate their being faulty) to fell it in winter. I am astonished at the universal confidence of some, that a serpent will rather creep into the fire than over a twig of Ash; this is an old imposture of Pliny, who either took it upon trust, or we mistake the tree. For other species, see Raii Dendrolog. tom. iii. lib. xxx. p. 95. De Fraxino, tom. ii. p. 1704.

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when the weather is very dry and warm, make an oblong incision, and take off from the bark of the tree about three inches in length and two in breadth; they leave the wound open, and by degrees the manna runs out, and is almost suddenly thickened to its proper consistence, and is found adhering to the bark of the tree. This manna is collected in baskets, and goes under the name of *Manna Grassa*. When the people want to have a very fine manna, they apply to the incision of the bark thin straw, or small bits of shrubs, so that the manna, in coming out, runs upon these bodies, and is collected in a sort of regular tubes, which give it the name of *Manna in canoli*; that is, manna in tubes. This kind is always preferred to the other, because it is free and clear."



The Chestnut Tree

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J. Miller del. & Sc.

C H A P. VIII.

The CHESNUT*.

CASTANEA, the Chestnut. Of this Pliny reckons many kinds, especially about Tarentum and Naples, but we commend those of Portugal or Bayonne, choosing the largest, brownest, and most ponderous for fruit, such as Pliny calls *Coctivæ*, but the lesser ones for raising timber. They are produced best by sowing and setting; previous to which, let the nuts be first spread to sweat, then cover them in sand: a month being past, plunge them in water and reject the swimmers; being dried for thirty days more, sand them again, and to the water-ordeal as before. Being thus treated till the beginning of spring, or in November, set them as you would do beans; and, as some practise it, drenched, for a night or more, in new milk: But without half this preparation they need only be put into the holes with the point upmost, as you plant Tulips. Pliny will tell you, they come not up, unless four or five be piled together in a hole, but that is false; if they be good, as you may presume all those to be.

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* Dr. Linnæus has, with great botanical propriety, made the Chestnut a species of *Fagus*; but as Mr. Evelyn and others have considered them as separate, I think I shall be more generally understood by retaining the old distinction.—The species are,

I. *CASTANEA (Sativa)* foliis lanceolatis acuminato-ferratis, subtus nudis. *Chestnut with spear-shaped leaves, which are sharply sawed, and naked on their under side.*
Castanea sativa. C. B. P. 418. *The manured Chestnut.*

This beautiful tree deserves to be ranked with timber-trees of the first class, whether we consider its ornamental appearance when growing, or its uses when felled. The leaves are large, of a pleasant green colour, and in the autumn turn to a golden yellow; so that in that declining season, amongst the different tinges in a wood, this is very conspicuous, and makes an agreeable contrast. If these trees are planted in large wilderness quarters next the walks, or in woods by the side of the ridings, and are left untrimmed, as they ought to be, they will be feathered to the bottom, and not only make a beautiful appearance, but all the summer will hide those naked and crooked stems of other trees, in the plantations and woods, which are always esteemed disagreeable objects. This tree was formerly cultivated in this island in greater quantities than at present; and appears to have been the chief timber, in earlier times, used for building.—It were greatly to be wished, that the antient spirit of propagating the Chestnut could be revived, as the timber is excellent in its kind, being as valuable as the Oak, and in many respects superior to it; like that King of our woods, (for this title the Oak must

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which pass the examination, nor will any of them fail; but being come up, they thrive best unremoved, making a great stand for at least two years upon every transplanting; yet if needs you must alter their station, let it be done about November, and that into a light friable ground, or moist gravel; however they will grow even in clay, sand, and all mixed soils, upon exposed and bleak places, and the pendent declivities of hills to the north, in dry airy places, and sometimes, though not so well, near marshes and waters; but they affect no other compost, save what their own leaves afford them, and are more patient of cold than heat. As for their sowing in the nursery, treat them as you are taught in the Walnut.

2. If you design to set them in winter or autumn, I counsel you to inter them within their husks, which, being every way armed, are a good protection against the mouse, and a providential integument. Pliny, lib. xv. cap. xxiii. from this natural guard, concludes them to be excellent food;

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still retain) it yields the industrious planter an annual crop. The nuts of this tree are equally well liked by the deer, and by swine are even preferred to the acorn.—The uses of the timber of this tree, like that of the Oak, are almost universal. It is not only excellent for all sorts of buildings, but it is also serviceable for mill-timber and water-works; so that if pipes bored of this wood lie constantly under ground, they will endure longer than the Elm.—Of the Chestnut are made very fine tables, stools, chairs, chests, and bedsteads. It is preferred for the making all sorts of tubs and vessels to hold liquor; and in this respect it is superior to the Oak; because, when once thoroughly seasoned, it is not subject either to shrink or swell, but will constantly maintain an equal magnitude of bulk; and for this reason the Italians make their casks and tuns for wine of this wood. For smaller purposes it has its superior advantages: Poles of this tree for hops, vines, &c. will last longer than of any other; and stakes of the underwood will last nearly twice as long as those of any other sort.

2. *CASTANEA (Pumila)* foliis lanceolato-ovatis acutè serratis, subtus tomentosis, amentis filiformibus nodosis. Gron. Virg. 150. *Chestnut with oval spear-shaped leaves sharply sawed, which are woolly on their under side, and a slender knotted katkin.* *Castanea pumila* Virginiana, racemoso fructu parvo in singulis capsulis echinatis unico. Pluk. Alm. 90. *The Chinquapin.*

The Chinquapin, or Dwarf Virginian Chestnut, is at present very rare in England: it is very common in the woods of America, where it seldom grows above twelve or fourteen feet high, and produces great plenty of nuts, which are, for the most part, single in each outer coat or capsule. This tree is very hardy, and will resist the severest of our winters in the open ground, but is very apt to decay in summer, especially if it is planted in very dry ground. The nuts of these trees, if

and doubtless Cæsar thought so, when he transported them from Sardis CH. VIII.
first into Italy, whence they were propagated into France, and thence among
us; another encouragement to make such experiments out of foreign coun-
tries. Some sow them confusedly in the furrow like the acorn, and govern
them as the Oak; but then should the ground be broken up betwixt No-
vember and February; and when they spring, be cleansed and thinned two
feet asunder, after two years growth: Likewise may copes of Chesnuts be
wonderfully increased and thickened, by laying the tender and young

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brought from America, should be put up in sand as soon as they are ripe, and sent
to England immediately, otherwise they lose their growing quality, which is the
reason this tree is at present so scarce with us; for not one seed in five hundred
sent over ever grows, owing to the neglect of putting them up in this manner: In-
deed, most of the nuts which have been brought over, have been kiln-dried, to
preserve them from sprouting, which infallibly destroys the germen. When the
nuts arrive, they should be put into the ground as soon as possible; and if the
winter should prove severe, it will be proper to cover the ground with leaves, tan,
or pease-haulm, to prevent the frost from penetrating the ground, so as to destroy
the nuts. This sort of Chesnut delights in a moist soil; but if the wet continues
long upon the ground in winter, it is apt to kill the trees. This will take by
inarching it upon the common sort, but the trees so propagated seldom succeed
well.

In the system of Linnæus the Chesnut is ranked in the class and order *Monœcia*
Polyandria. The male flowers are collected in long catkins, and begin to open about
the ninth of May. The buds usually appear about the fourteenth of April, and in
six or seven days after the leaves will be quite out, and remain green till the twelfth
of October, when they assume a fine yellow colour.

The culture of this tree is as follows: Having provided a sufficient quantity of nuts,
throw them into water, to know whether they are sound and good; the sound ones will
sink to the bottom, whilst the others will shew themselves to be faulty by swimming.
This method should be always practised, that you may be certain of your seeds, whe-
ther they are of English or foreign growth. Indeed, in some cold damp soils, Ches-
nut-trees seldom perfect their seeds here; but where they do, our English trees produce
very good seeds for the purpose; though it is generally allowed that those brought
from Portugal and Spain are better.

The goodness of the nuts being thus proved, and having a sufficient quantity of
ground properly prepared for the seminary, in the month of February let drills, about
a foot distance from each other, be made across this ground, about four inches deep,
in which let the nuts be placed, at about four inches distance, throughout every drill.
Some people recommend the eye of the nut to be placed uppermost, but there seems

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branches; but such as spring from the nuts and marrons are best of all, and will thrive exceedingly, if (being let stand without removing) the ground be stirred, and loosened about their roots for two or three of the first years, and the superfluous wood pruned away; and indeed for good trees, they should be shriped up after the first year's removal; they also shoot into gallant poles from a felled stem: Thus will you have a copse ready for a felling, within eight years, which, besides many other uses, will yield you incomparable poles for any work of the garden, vineyard, or hop-yard, till the

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no necessity for such a caution; nature in all cases of sowing pushes the germ upwards and the root downwards; and if we were, by way of experiment, to turn the germ of a new-sprouted bean downwards and the root upwards, the plant, from a kind of vegetable instinct impressed upon it by the Author of Nature, would counteract our intentions, and in a few days the germ and root would reassume their former positions.

In the spring, when the young plants appear, they should be kept clear from weeds; and as often as any weeds present themselves, they must be plucked up during the time the trees remain in the seminary, which ought to be two years from the time of sowing.

A seminary of these trees, planted in this manner, should always be hand-weeded, because, being pretty near each other, it would be dangerous to introduce a hoe among them, for fear of hurting the tender rind, which would greatly injure the plants so wounded.—The plants, having stood in the seminary two years, must be carefully taken up, all the side-shoots taken off, and the tap-root shortened; then, having ground in the nursery double dug, let them be planted in this ground in rows, which should be two feet and a half or three feet asunder, and set them at least one foot and a half distant in these rows. The best time for doing this work will be the latter end of February; for if they are planted in October, the severe frosts will be subject to throw the young plants out of the ground before winter is over. A year after they have been planted in the nursery, it will be very proper to cut every one of them down to within an inch of the ground; which will cause them to shoot vigorously with one strong and straight stem. Without this treatment, they are very subject to grow scraggy and crooked, and to make but slow progress; so that where they do not take well to the ground, and shoot irregularly, they should be cut down according to this direction; after which they will shoot strongly, and overtake those that never underwent this operation, though planted some years before them, in a very short time.

In this nursery they may remain four or five years, when they will be fit to plant out, with no other pruning than taking off very strong side-branches, and such as have a tendency to make the tree forked. The only trouble the ground will occasion, will be keeping it clear of weeds, and every winter digging between the rows.—After they are of a sufficient size to be planted out for standards, either in fields, clumps, wilderness quarters, or avenues, they should be carefully taken out of the nursery; and having holes dug three feet square, and a foot and a half deep, with the turf chopt small

next cutting; and if the tree like the ground, it will, in ten or twelve years, grow to a kind of timber, and bear plentiful fruit.

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3. I have seen many Chesnut-trees transplanted as big as my arm, their heads cut off at five and six feet height, but they came on at leisure. In such plantations, and all others for avenues, you may set them from thirty to ten feet distance, though they will grow much nearer, and shoot into poles, if, being tender, you cultivate them like the Ash, the nature of

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at the bottom of each hole, and all the bruised parts of the roots taken off, the finest mould should cover the fibres; observing always to plant them no deeper than the surface of the soil. After this, they may be turfed round to keep them steady against the winds. The best month for this work is October.

When these trees are designed for timber, they should remain unremoved; but where the fruit of them is more sought after, then it is certainly the better way to transplant them: for as transplanting is a check to the luxuriant growth of trees, so it is a promoter of their fructification, as may be evinced by observing low shrubby Oaks, Walnuts, &c. which generally have a greater plenty of fruit than any of the larger and more vigorous; and the fruit of such trees is much superior in taste, though the seeds of vigorous trees are vastly preferable for plantations of timber: for it is a constant observation, that, by saving seeds from dwarf trees or plants, from time to time, they may be rendered much lower in their growth than is their natural size; but where the fruit is most desired, then they should be taken from such trees as produce the largest and sweetest nuts, which are commonly found upon such trees as spread the most, and have horizontal roots; for the weaker trees being less capable to furnish a supply of nourishment, and having a greater quantity of fruit upon them, to which this must be distributed, together with their roots lying near the surface of the ground, (by which means the juices are better prepared by the sun, air, &c. before it enters their vessels) it is certain their juices are better digested, and their fruits better matured, than those can possibly be, which grow upon strong vigorous trees, which have long tap-roots running several feet deep into the earth, and consequently take in vast quantities of crude unprepared juices.

If you design a large plantation of these trees for timber, after having two or three times ploughed the ground, the better to destroy the roots of weeds, you should make your furrows about six feet distance from each other, in which you should lay the nuts about ten inches asunder, covering them with earth about three inches deep; and, when they come up, you must carefully clear them from weeds: the distance allowed between each row, is for the use of the horse-hoeing plow, which will dispatch a great deal of this work in a short time; but it should be performed with great care, so as not to injure the young plants; therefore the middle of the spaces only should be cleaned with this instrument, and a hand-hoe must be used to clean between the plants in the rows, and also on each side, where it will be unsafe for the plow to be drawn: and in

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whose shade it resembles, since nothing affects much to grow under it. Some husbands tell me, that the young Chestnut-trees should not be pruned or touched with any knife or edge-tool for the first three or four years, but rather cropped or broken off, which I leave to farther experience; however, many forbear to top them when they transplant.

4. The Chestnut being grafted on the Walnut, Oak, or Beech, I have been told, will come exceeding fair, and produce incomparable fruit; for

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hand-hoeing, there must be great care taken not to cut the tender rind of the plants. If the following spring the spaces are carefully stirred with the plow, it will not only make the ground clean, but also loosen it, so as that the sun and moisture may more easily penetrate the same, which will greatly promote the growth of the plants; and the oftener these plowings are repeated, the cleaner will be the ground, and the greater will be the progress of the plants, which cannot be kept too clean while they are young. When these have remained three or four years, if the nuts succeed well, you will have many of these trees to remove, which should be done at the seasons before directed, leaving the trees distant about three feet in the rows; at which distance they may remain for three or four years more, when you should remove every other tree to make room for the remaining ones, which will reduce the whole plantation to six feet square, which will be distance enough for them to remain in, until they are large enough for poles, when you may cut down every other of these trees (making choice of the least promising) within a foot of the ground, in order to make stools for poles, which, in eight or ten years time, will be strong enough to lop for hoops, hop-poles, &c. for which purposes they are preferable to most other trees; so that every tenth year there will be a fresh crop, which will pay the rent of the ground, and all other incumbent charges, and, at the same time, a full crop of growing timber will be left upon the ground: but as the large trees increase in bulk, their distance of twelve feet square will be too small; therefore when they have grown to a size for small boards, you should fell every other tree, which will reduce them to twenty-four feet square, which is a proper distance for them to remain for good; this will give air to the underwood (which, by this time, would be too much overhung by the closeness of the large trees); by which means that will be greatly encouraged, and the fall of the small timber will pay sufficient interest for the money at first laid out in planting, &c. with the principal also: so that all the remaining trees will be clear profit, as the underwood, still continuing, will pay the rent of the ground, and all other expences.

I have here ventured to recommend the raising a wood of Chestnut-trees from the nut, by the authority, and in the words of Mr. Miller; but Mr. Hanbury contends that it is much better to plant such a wood from the nursery. He says, "Where a wood of these trees is wanted, they should be raised in the nursery way; and when the plants are about five feet high, they will be of the properest size for the purpose; for they will then not be so large as to require staking, nor yet so small but that they will be out of

the Walnut and Chestnut on each other, it is probable, but I have not yet made a full attempt. They also speak of inoculating Cherries on the Chestnut-stock for a later fruit. In the mean time, I wish we did more universally propagate the Horse-Chestnut, which, being easily increased from layers, grows into a goodly standard, and bears a most glorious flower, even in our cold country. This tree, so called from its curing horses broken-winded, and other cattle of coughs, is now all the mode for the avenues to their country palaces in France, as appears by the late Superintendent's plantation at Vaux. It was first brought from Constantinople to Vienna,

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the reach of hares, rabbits, &c. Therefore, as soon as the trees are about this height in the nursery, let the ground designed for the wood be plowed deep with a very strong plow, that the uppermost and the best part of the soil may be laid as low as possible, to be of greater nourishment to the tree, when it receives its tender fibres. The distance these trees should be planted from one another ought to be two yards; and this will be a proper distance for them to grow up to poles; when they should be cut down, only leaving a sufficient number of the best and most thriving trees for timber. Thus, whilst the latter are making their progress to a larger bulk, being left at a distance of near twenty feet, the poles will, at the interval of fourteen years from the first planting, reward the owner's toils with no inconsiderable profits; and if they are cut down within about a foot of the ground, there will be stools for another crop of poles, which will be ready for a second cutting in about ten years: so that every ten years the planter will taste the sweets of his labour, while his expectations are still augmented, as to the advantage of his family in after-times. If the plantation is large, I would advise to begin the first fall of poles so early, and to defer the latter so late, that the year after the last fall the stools of the first-cut poles shall have sent forth poles ready for a second cutting. Thus the proprietor will not only enjoy the benefits of an annual sale, but the country will not be glutted with too great a quantity of poles at a time, and consequently they may be sold at a better price.

"Such are the directions I would give for raising a wood of these trees; which I take to be better than planting the nuts, and letting them remain; not only because the plant is then subject to a tap-root, which strikes directly into the ground beyond the reach of nourishment, and consequently must in proportion grow slower, but also because the expences will be less. While they are in the nursery, a vast quantity of them will stand upon a small space of ground, and consequently be raised at a small expence; but when the nuts are planted with a design to remain, the whole extent of the ground intended for the wood must be kept clear of weeds till the plants are grown of a sufficient size to defend themselves." *Body of Planting, p. 14.*

The Chestnut will thrive on almost all soils and in all situations. It will grow best, indeed, in a rich loamy land; but it will succeed very well on that which is gravelly, clayey, or sandy. All mixed soils are suitable to it, as well as exposed places, and the declivities of hills.

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thence into Italy, and so to France; but to us from the Levant more immediately, and flourishes so well, and grows so goodly a tree in competent time, that, by this alone, we might have ample encouragement to denizen other strangers amongst us. One inconvenience to which this beautiful tree is obnoxious, is, that it does not well resist impetuous and stormy winds without damage*.

5. The Chestnut is, next the Oak, one of the most sought after by the carpenter and joiner. It hath formerly built a good part of our ancient houses in the City of London, as does yet appear. I had once a very large barn near the city, framed intirely of this timber; and certainly

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* The Horse-Chestnut is a tree of singular beauty and use; the leaves are large, fine, and palmated, and appear very early in the spring. It is naturally uniform in its growth, forming its head, if left to nature, into a regular parabola. In the spring it produces long spikes of beautiful flowers; and although in the autumn its leaves fall off pretty early, it makes amends by exhibiting its nuts of a bright brown colour, some on the ground, some ready to fall, and others just peeping out of their cells.

This tree is a native of the East, and is said to have been brought into Europe in 1610; at which time also the Laurel was introduced into the English gardens: But we have reason to believe that this tree was brought from Constantinople, and made a denizen of England, almost an hundred years before the abovementioned period.

This tree is very proper to be planted for avenues or walks; though I know it has been objected by some, that its leaves fall early in the autumn: But it should be considered that it shoots out proportionably earlier in the spring, which, together with its beautiful flowers, makes it an ornamental and desirable tree.

The Horse-Chestnut-tree is extremely well adapted to parks; not only because it grows to a large size, and forms a beautiful regular head, thereby at a distance striking the imagination with a pleasing surprize, but on account of the quantity of nuts it produces, which are excellent food for deer in the rutting season: So that in parks where great numbers of deer are kept, I would recommend these trees to be planted in abundance. They are likewise very proper for the boundaries of open fields, to terminate views, &c. and though there are no deer to eat the nuts, yet the swine are equally delighted with them, and will fatten greatly with such provender.

The buds of this tree, before they shoot out leaves, become turgid and large; so that they have a good effect to the eye, by their bold appearance, long before the leaves appear: And what is peculiar to the Horse-Chestnut is, that as soon as the leading shoot is come out of the bud, it continues to grow so fast, as to be able to form its whole summer's shoot in about three weeks or a month's time. After this it grows little or nothing more in length, but thickens, and becomes strong and woody, and forms the buds for the next year's shoot. The flowers are in full blow about the twelfth of May, and on fine old trees make a pleasing appearance. They have seven



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the trees grew not far off, probably in some woods near the town; for, in that description of London, written by Fitz-Stephens, in the reign of Henry II. he speaks of a very noble and large forest which grew on the boreal part of it; *Proxime*, says he, *patet foresta ingens, salus nemorosi ferarum, latebræ cervorum, damarum, aprorum, & taurorum sylvestrium*, &c. A very goodly thing it seems, and as well stored with all sorts of good timber as with venison and all kind of chafe; and yet some will not allow the Chestnut to be a freeborn of this island, but of that I make little doubt *. The Chestnut affords the best stakes and poles for palisades, pedaments

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stamina and one style, which shews the tree to be of the class and order *Heptandria Monogynia*. Sir Charles Linnæus has altered the old title to that of *Esculus*.

This tree is propagated from the nut: In autumn, therefore, when the nuts fall, a sufficient quantity should be gathered. Some people recommend them to be sown immediately in drills; but others, with more propriety, delay the sowing till the spring, by which means they will escape the ravages of the field-mouse. Previous to sowing they should be thrown into water, as directed in page 48, which will secure to the planter the certainty of a crop.

In the spring the plants will come up; and when they have stood one year they may be taken up, their tap-roots shortened, and afterwards planted in the nursery, and managed in the same manner as was directed for the Spanish Chestnut.

When they are of sufficient size to be planted out for good, they must be taken out of the nursery with care, the great side-shoots and the bruised parts of the roots should be taken off, and then planted in large holes level with the surface of the ground, at the top of their roots, the fibres being all spread and lapped in the fine mould, and the turf also worked to the bottom. A stake should be placed to keep them safe from the winds, and they must be fenced from the cattle till they are of a sufficient size to defend themselves. The best season for this work is October.—After the trees are planted, neither knife nor hatchet should come near them; but they should be left to Nature to form their beautiful parabolic heads, and assume their utmost beauty.

The Horse-Chestnut, like most other trees, delights most in good fat land; but it will grow exceeding well on clayey and marley grounds. I have seen large trees, luxuriant and healthy, in very cold, barren, and hungry earth. In short, it is not very nice in its diet, but may be planted in most places to the owner's satisfaction. It grows to a large size in a few years.

* In the sixty-first volume of the Philosophical Transactions, Dr. Ducarel very learnedly opposes the opinion of the Hon. Mr. Daines Barrington, who, in the fifty-ninth volume of the same work, had asserted that "Chestnut-trees were not natives of this kingdom."—The arguments produced by the Doctor appear to me sufficiently conclusive in favour of these trees being indigenous.

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for vine-props and hops, as I said before. It is good for mill-timber or water-works, or where it may lie buried; but if water touch the roots of the growing trees, it spoils both fruit and timber. It is likewise observed, that this tree is so prevalent against cold, that, where they stand, they defend other plantations from the injuries of the severest frosts. I am sure, being planted in hedge-rows, & *circa agrorum itinera*, or for avenues to our country houses, they are a magnificent and royal ornament. This timber also does well, if kept dry, for columns, tables, chests, chairs, stools, bedsteads; for tubs and wine-casks, which it preserves with the least tincture of the wood of any whatsoever. If the timber be dipped in scalding oil, and well pitched, it becomes extremely durable, but, otherwise, I cannot celebrate the tree for its sincerity, it being found that, contrary to the Oak, it will make a fair shew outwardly when it is all decayed and rotten within; but this is in some sort recompensed, if it be true that the beams made of Chesnut-tree have this property, that, being somewhat brittle, they give warning and premonish the danger by a certain crackling, so as, it is said, to have frightened those out of the baths at Antandro, whose roof was laid with this material, but which, Pliny says, was of Hazle, very unlike it. Formerly they made consultatory staves of this tree; and the variegated rods which Jacob peeled to lay in the troughs, to impress a fancy in his Father-in-law's conceiving ewes, are said to have been of this material. The coals are excellent for the smith, being soon kindled, and as soon extinguished; but the ashes of Chesnut-wood are not convenient to make a lee with, because it is observed to stain the linen. As for the fruit, it is better to beat it down from the tree some little time before they fall off themselves; thus they will the better keep, or else you must smoak-dry them. But we give that fruit to our swine in England, which is amongst the delicacies of princes in other countries, and, being of the larger nut, is a lusty and masculine food for rusticks at all times, and of better nourishment for husbandmen than cole and rusty bacon, yea, or beans to boot; instead of which, they boil them in Italy with their bacon; and, in Virgil's time, they eat them with milk and cheese*. The best tables in France and Italy make them

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* Tityrus, in his invitation to Melibœus, says,

Sunt nobis mitia poma,
Castanæ molles, et pressi copia lactis.

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Chestnuts are a very harsh food, so that we should understand by *Castanæ molles*, roasted Chestnuts. Pliny says, "Torrere has in cibis gratus."

a service, eating them with salt, in wine, or juice of lemon and sugar, being first roasted on embers on the chaplet; and, doubtless, we might propagate their use among our common people, as of old the *Βαλαναράχοι*, being a food so cheap, and so lasting. In Italy they also boil them in wine, and then smoak them a little; these they call anseri or geese, I know not why. Those of Piemont add fennel, cinnamon and nutmeg to their wine: if in water, they mollify them with the vapour only, but first they peel them; others macerate them in rose-water. The bread of the flour is exceeding nutritive; it is a robust food, and makes women well complexioned, as I have read in a good author. They also make fritters of Chestnut flour, which they wet with rose-water, and sprinkle with grated parmigiano, and so fry them in fresh butter for a delicate. How we here use Chestnuts in stewed meats and beatille pies, our French Cooks teach us; and this is in truth their very best use, and very commendable; for it is found that the eating of them raw, or in bread, as they do much about Limosin, is apt to swell the belly, though without any other inconvenience that I can learn; and yet some condemn them as dangerous for such as are subject to the gravel in the kidneys; and however cooked and prepared, flatulent, offensive to the head and stomach, especially to those who are subject to the cholick. The best way to preserve them, is to keep them in earthen vessels in a cold place; some lay them in a smoak-loft, others in dry barley-straw, others in sand, &c. The leaves of the Chestnut-tree make very wholesome mattresses to lie on, and they are good litter for cattle: But those leafy-beds, for the crackling noise they make when one turns upon them, the French call *lits de parlement*. Lastly, the flour of Chestnuts, made into an Electuary, and eaten with honey fasting, is an approved remedy against spitting of blood, and the cough: And a decoction of the rind of the tree, tinctures hair of a golden colour, esteemed a beauty in some countries. For other species, vide Raii Dendrolog. tom. iii.

C H A P. IX.

The WALNUT*.

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† Macrob. Saturn. Lib. ii. cap. xiv.

1. *JUGLANS*, *quasi Jovis glans* †, the Wall, or Welch, Nut is of several sorts, the soft shell and the hard, the whiter and the blacker grain; the black bears the worst nut, but the timber is much to be preferred, and we might propagate more of them if we were careful to procure them out of Virginia, where they abound and bear a squarer nut, of all others the most beautiful and best worth planting: Indeed, had we store of these, we should soon despise the rest; yet those of Grenoble come in the next place, and are much prized by our cabinet-makers. At all events, be sure to plant from young and thriving trees, bearing full and plump kernels. It is said that the Walnut kernel wrapped in its own leaf, being carefully taken out of its shell, brings a nut without shell; but this is a trifle. The best way to elevate them, is to set them as you do the Ches-

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* Formerly the Walnut-tree was much propagated for its wood; but since the importation of Mahogany and the Virginia Walnut, it has considerably decreased in reputation. Mr. Miller enumerates six species of this tree.

1. *JUGLANS (Regia)* foliolis ovalibus glabris subferratis subæqualibus. Hort. Cliff. 449. *Walnut with oval small leaves or lobes, which are smooth, sawed, and equal.* Nux juglans five Regia vulgaris. C. B. P. 417. *Common Walnut.*

Of the common Walnut there are several varieties, which are distinguished by the following titles: the large Walnut, the thin-shelled Walnut, the French Walnut, the late-ripe Walnut, and the double Walnut; but these do all of them vary when raised by the seed, so that the nuts from the same tree will produce plants whose fruit will differ; therefore there can be no dependence upon the trees which are raised from nuts, till they have produced fruit; so that those persons who plant the trees for their fruit, should make choice of them in the nurseries when they have their fruit upon them, otherwise they may be deceived, by having such as they would not choose.

2. *JUGLANS (Nigra)* foliolis quindenis lanceolatis ferratis, exterioribus minoribus, gemmulis super axillaribus. Hort. Cliff. 449. *Walnut-tree with spear-shaped lobes which are sharply sawed, the middle being the largest.* Nux juglans Virginiana nigra. Catseb. Car. *Black Virginia Walnut.*

This grows to a large size in North America. The leaves are composed of five or six pair of spear-shaped lobes, which end in acute points, and are sawed on their



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nut, being planted of the nut, or set at the distance you would have him stand; for which they may be prepared by beating them off the tree, as was prescribed of the Chestnut, some days before they quit the branches of themselves, and keeping them in their husks, or without them, till spring, or by bedding them, being dry, in sand or good earth, till March or earlier, from the time they fell, or were beaten off the tree: But if before, they should be set with husks and all upon them; for the extreme bitterness thereof is most exitial and deadly to worms; or it were good to strew some furzes, broken or chopped small, under the ground amongst them, to preserve them from mice and rats, when their shells begin to wax tender; especially if, as some, you supple them a little in warm cow's milk; but being treated as before, you will find them already sprouted, and have need only to be planted where they are to abide; because, as we said long since, they

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edges; the lower pair of lobes are the least, the other gradually increase in their size to the top, where the pair at the top, and the single lobe which terminates the leaf, are smaller; these leaves, when bruised, emit a strong aromatic flavour, as do also the outer cover of the nuts, which are rough, and rounder than those of the common Walnut. The shell of the nut is very hard and thick, and the kernel small, but very sweet.

3. *JUGLANS (Oblonga)* foliolis cordato-lanceolatis infernè nervosis, pediculis foliorum pubescentibus. *Walnut with heart spear-shaped lobes, having many veins on their under side, and downy foot-stalks to the leaves.* *Juglans nigra*, fructu oblongo profundissime insculpto. Hort. Chelf. *Black Virginia Walnut, with an oblong fruit very deeply furrowed.*

This sort grows naturally in North America, where the trees grow to a large size.

The leaves are composed of seven or eight pair of long heart-shaped lobes, broad at their base, where they are divided into two round ears, but terminate in acute points; they are rougher, and of a deeper green than those of the second sort, and have nothing of the aromatic scent which they have. The fruit is very long. The shell is deeply furrowed, and is very hard. The kernel is small, but well flavoured.

4. *JUGLANS (Alba)* foliolis lanceolatis serratis, exterioribus latioribus. Lin. Sp. Plant. 997. *Walnut with spear-shaped sawed lobes, the outer being the broadest.* *Nux juglans alba Virginienfis.* Park. Theat. 1414. *White Virginia Walnut called Hickery Nut.*

This is very common in most parts of North America, where it is called Hickery Nut. The leaves are composed of two or three pair of oblong lobes, terminated by an odd one; these are of a light green, and sawed on their edges; the lower

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are most impatient of transplanting: However, if there be an absolute necessity of removing, let your tree never be above four years old, and then by no means touch the head with your knife, nor cut away so much as the very tap-root, being so old, if you can well dispose of it, since being of a pithy and hollow substance, the least diminution, or bruise, will greatly endanger the killing: But see here what we have said of the Chestnut. I have been told, that the very tops and palish buds of this tree, when it first sprouts, though as late as April, will take hold of the ground, and grow to an incredible improvement; but first they steep them in milk and saffron: however this attempt did not succeed with us, yet it may be propagated by a branch slipped off with some of the old wood, and set in February.

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pair of lobes are the smallest, and the upper the largest. The fruit is shaped like the common Walnut; but the shell is not furrowed, and is of a light colour.

5. *JUGLANS (Glabra)* foliis cuneiformibus serratis, exterioribus majoribus. *Walnut with wedge-shaped lobes which are sawed, the outer being the largest.* *Juglans alba* fructu minori cortice glabro. Clayt. Flor. Virg. *White Walnut with a smaller fruit, and a smooth bark.*

This sort is not so large as the last. The leaves are composed of two pair of lobes, terminated by an odd one; these are narrow at their base, but broad and rounded at their ends; they are sawed on their edges, and are of a light green. The nuts are small, have a smooth shell, and are very hard and white.

6. *JUGLANS (Ovata)* foliis lanceolatis serratis glabris subæqualibus. *Walnut with smooth, spear-shaped, sawed lobes, which are equal.* *Juglans alba* fructu ovato compresso, nucleo dulci, cortice squamoso. Clayt. Flor. Virg. *White Walnut with an oval compressed fruit, a sweet kernel, and a scaly bark, commonly called Shag-bark in America.*

This kind grows naturally in North America, where it rises to a middling stature. The leaves are composed of three pair of smooth spear-shaped lobes, of a dark green colour, sawed on their edges, and ending in acute points. The fruit is oval, the shell white, hard, and smooth, the kernel small, but very sweet. The young shoots of the tree are covered with a very smooth brownish bark, but the stems and older banches have a rough scaly bark, from whence it has the appellation of Shag-bark, in America.

The Walnut, in the Linnæan system, belongs to the class and order *Monoccia Polyandria*. The flowers begin to open about the middle of April, and are in full blow by the middle of May, before which time the leaves are fully displayed.

These trees are propagated by planting their nuts, which seldom produce the same sort of fruit as sown; so that the only way to have the desired sort, is to sow the nuts.

An industrious and very experienced husbandman told me, that if they be transplanted as big as one's middle, it may be done safer than when younger; I do only report it. What they hint of putting a tile-shard under the nuts when first set, to divaricate and spread the roots (which are otherwise apt to penetrate very deep) I like well enough. It is certain they will receive their own cyons being grafted, and that it does improve their fruit. The best compost is the strewing of ashes at the foot of the trees, the salt whereof being washed into the earth, is the best dressing, whilst the juice of the fallen leaves, though it kill the worm, is noxious to the root. This tree does not refuse to thrive even among others, and in great woods, provided you shrip up the collateral arms.

2. The Walnut delights in a dry, sound, and rich land, especially if it incline to a feeding chalk or marl; and where it may be protected from

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of the best kinds; and if this is done in a nursery, the trees should be transplanted out when they have had three or four years growth, to the place where they are designed to remain; for these trees do not bear transplanting when they are of a large size, therefore there should be a good number of the trees planted, which need not be put at more than six feet apart, which will be distance enough for them to grow till they produce fruit; when those, whose fruit are of the desired kind, may remain, and the others cut up, to allow them room to grow. By this method a sufficient number of the trees may be generally found among them to remain, which will thrive and flourish greatly when they have room; but as many people do not care to wait so long for the fruit, the next best method is to make choice of some young trees in the nurseries, when they have their fruit upon them. But though these trees will grow and bear fruit, yet they will never be so large or so long-lived, as those which are planted young.

All the sorts of Walnuts which are intended for timber, should be sown in the places where they are to remain; for the roots of these trees always incline downward, which being stopped or broken, prevent their aspiring upward, so that they afterwards divaricate into branches, and become low spreading trees; but such as are propagated for fruit, are greatly mended by transplanting; for hereby they are rendered more fruitful, and their fruit is generally larger and fairer; it being a common observation, that downright roots greatly encourage the luxuriant growth of timber in all sorts of trees; but such trees as have their roots spreading near the surface of the ground, always produce the greatest quantity and best-flavoured fruit.

In transplanting these trees, you should observe never to prune either their roots or large branches, both which operations are very injurious to them; nor should you be too busy in lopping or pruning the branches of these trees when grown to a large size, for it often causes them to decay; but when there is a necessity for cutting any of their branches off, it should be done early in September (for at that season the trees are not

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the cold, (though it affect cold rather than extreme heat) as in great pits, valleys, and highway sides; also in stony-grounds, if loamy, and on hills, especially chalky; likewise in corn-fields. Thus Burgundy abounds with them, where they stand in the midst of goodly wheat-lands, at sixty and an hundred feet distance, and so far are they from hurting the crop, that they are looked upon as great preservers by keeping the ground warm, nor do the roots hinder the plow. Whenever they fell a tree, which is only the old and decayed, they always plant a young one near him; and in several places betwixt Hanaw and Frankfort in Germany, no young farmer whatsoever is permitted to marry a wife, till he bring proof that he hath planted, and is a father of such a stated number of Walnut-trees; and the law is inviolably observed to this day, for the extraordinary benefit which this tree affords the inhabitants: In truth, were this timber in greater plenty amongst us, we should have far better utensils of all sorts for our

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so subject to bleed) that the wound may heal over before the cold increases; the branches should always be cut off quite close to the trunk, otherwise the stump which is left will decay, and rot the body of the tree.

The best season for transplanting these trees is as soon as the leaves begin to decay, at which time if they are carefully taken up, and their branches preserved entire, there will be little danger of their succeeding, although they are eight or ten years old, as I have several times experienced; though, as was before observed, these trees will not grow so large, or continue so long, as those which are removed young. This tree delights in a firm, rich, loamy soil, or such as is inclinable to chalk or marl; and will thrive very well in stony ground, and on chalky hills, as may be seen by those large plantations near Leatherhead, Godstone, and Carshalton in Surry, where great numbers of these trees are planted upon the downs, which annually produce large quantities of fruit, to the great advantage of their owners.

The distance these trees should be placed, ought not to be less than forty feet, especially if regard be had to their fruit; though when they are only designed for timber, if they stand nearer, it promotes their upright growth. The black Virginia Walnut is much more inclinable to grow upright than the common sort, and the wood being generally of a more beautiful grain, renders it preferable to that, and better worth cultivating. I have seen some of this wood beautifully veined with black and white, which, when polished, has appeared at a distance like veined marble. This wood is greatly esteemed by the cabinet-makers for inlaying, as also for bedsteads, chairs, tables, and cabinets; and is one of the most durable woods for those purposes of English growth, being less liable to be infected with insects than most other kinds (which may proceed from its extraordinary bitterness); but it is not proper for buildings of strength, it being of a brittle nature, and exceeding subject to break very short, though it commonly gives notice by its crackling some time before it breaks.

houfes, as chairs, stools, bedsteads, tables, wainscot, cabinets, &c. instead of the more vulgar Beech, subject to the worm, weak and unsightly; but which, to counterfeit and deceive the unwary, they wash over with a decoction made of the green husks of Walnuts, &c. I say, had we store of this material, especially of the Virginian, we should find an incredible improvement in the more stable furniture of our houses, as in the first frugal and better days of Rome.

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Illa domi natus, nostraque ex arbore menfas
Tempora viderunt: hos lignum stabat in usus,
Annosam si fortè nucem dejecerat Eurus.

Juv. Sat. xi.

For if it had been cut in that season, it would not have proved so sound, as we shew in our chapter of felling. It is certain, that the *Mense Nucine* were once in price even before the Citron, as Strabo notes; and nothing can be more beautiful than some planks and works which I have beheld of it, especially that which comes from Grenoble, of all others the most beautiful and esteemed.

3. They render most graceful avenues to our country dwellings, and do excellently near hedge-rows; but had need be planted at forty or fifty feet interval, for they affect to spread both their roots and branches. The Bergstras (which extends from Heidelberg to Darmstadt) is all planted with Walnuts; for so, by another antient law, the Borderers were obliged to nurse up and take care of them, and that chiefly for their ornament and shade, so as a man may ride for many miles about that country under a continued arbor, or close walk; the traveller both refreshed with the fruit and the shade, which some have causelessly defamed for its ill effects on the head*, for which the fruit is a specific and a notable signature; although I deny not, but the scent of the fallen leaves, when they begin to be damped with lying, may emit somewhat a heady steam, which to some has proved noxious, but not whilst they were fresh and lively upon the

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* In Italy, sleeping under trees was thought a great luxury:—

mollesque sub arbore somni

Non absunt.

VIRG.

On which account we must suppose that they were choice in the kind of trees most friendly to people overcome with sleep. The shade of the Walnut was held to be particularly unwholesome. Gravis et noxia, etiam capiti humano, omnibusque juxta satis. PLIN.

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trees. How would such public plantations improve the glory and wealth of a nation! But where shall we find the spirits among our countrymen? Yes, I will adventure to instance in those plantations of Sir Richard Stidolph, upon the Downs near Leatherhead in Surry; Sir Robert Clayton, at Morden, near Godstone, (once belonging to Sir John Evelyn) and so about Cassaulton, where many thousands of these trees do celebrate the industry of the owners, and will certainly reward it with infinite improvement, as I am assured they do already, and that very considerably; besides the ornament which they afford to those pleasant tracts, for some miles in circumference. There was lately, and for ought I know as yet, an avenue of four leagues in length, and fifty paces in breadth, planted with young Oaklings, as straight as a line, from the city of Utrecht to Amersfort, affording a most goodly prospect; which minds me of what Sorbiere tells in a sceptical discourse to Monsieur de Martel, speaking of the readiness of the people in Holland to furnish and maintain whatsoever may conduce to the public ornament, as well as convenience, "that their plantations of these and the like trees, even in their very roads and common highways, are better preserved and entertained (as I myself have likewise been often an eye-witness) than those about the houses and gardens of pleasure belonging to the Nobles and Gentry of most other countries;" and in effect it is a most ravishing object, to behold their amenities in this particular. With us, says he, speaking of France, they make a jest at such political ordinances, by running down these public and useful ornaments; if haply some more prudent magistrate do at any time introduce them. Thus in the reign of Henry IV. (during the superintendency of Monf. de Sully*) there was a resolution of adorning all the highways of France with Elms, &c. but the rude and mischievous peasants did so hack, steal, and destroy what they had begun, that they were forced to desist from the thorough

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* This celebrated Statesman emphatically styles Agriculture one of the *Breasts* from whence the state must draw its nourishment. Instructing by precepts, and stimulating by rewards, he prevailed upon his countrymen to cultivate the art; but their industry was of short duration: The public troubles soon put an end to Arts, Agriculture, and Commerce. Colbert conceived a different notion of policy; esteeming manufactures and commerce as the sinews of the state, he gave all possible encouragement to the Artizan and the Merchant,——but forgot that the Manufacturer must eat his bread at a moderate price. The Farmer being discouraged, the necessaries of life became dear;—the public granaries were ill stored;—manufactures languished;—commerce drooped;—a numerous army soon consumed the scanty harvest; and, in a short time, Industry fell a sacrifice to the ill-judged policy of the Minister.

prosecution of the design; so as there is nothing more exposed, wild, and less pleasant than the common roads of France for want of shade, and the decent limits which these sweet and divertissant plantations would have afforded. Not to omit that political use, as my Lord Bacon hints it, where he speaks of the statues and monuments of brave men, and such as had well deserved of the public, erected by the Romans even in their highways; since, doubtless, such noble and agreeable objects would exceedingly divert, entertain, and take off the minds and discourses of melancholy people, and pensive travellers, who having nothing but the dull and enclosed ways to cast their eyes on, are but ill conversation to themselves and others, and, instead of celebrating, censure their superiors. It is observed by a curious person, an industrious friend of mine, that the sap of this tree rises and descends with the sun's diurnal course, (which it visibly slackens in the night) and more plentifully at the root on the south side, though those roots cut on the north were larger, and less distant from the body of the tree; and not only distilled from the ends, which were next the stem, but from those that were cut off and separated, which was never observed to happen in the Birch, or other sap-yielding trees.

* Mr. Oldenburg speaks of one of the present Kings in Europe, who drinks much of the juice of this tree, and finds great benefit thereby.

* Phil. Transf.
vol. iii. N^o xl.
p. 802.

4. What universal use the French make of the timber of this sole tree, for domestic affairs, may be seen in every room both of poor and rich. It is of singular account with the joiner, for the best grained and coloured waincot; with the gunsmith for stocks; with the coach-maker for wheels and the bodies of coaches; in New England they make hoops, and bows for want of Yew; the drum-maker uses it for rims, the cabinet-maker for inlayings, especially the firm and close timber about the root, which is admirable for flecked and cambleted works, some wood especially, as that which we have from Bologna, New England, and Virginia (where there are three or four sorts, differing in leaf, fruit, and stature) very black of colour, and so admirably streaked, as to represent natural flowers, land-skips, and other fancies. To render this wood the better coloured, joiners put the boards into an oven after the batch is forth, or lay them in a warm stable; and when they work it, polish it over with its own oil very hot, which makes it look black and sleek, and the older it is, the more estimable; but then it should not be put in work till thoroughly seasoned, because it will shrink beyond expectation. It is only not good to confide in

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it much for beams or joists, because of its brittleness, yet of which, it has been observed to give timely notice, like the Chestnut, by the crackling, before it breaks. Besides the uses of the wood, the fruit, with husk and all, when tender and very young, is used for preserves (being condited in separate decoctions) by our curious Ladies. It makes also food and oil; this last is of extraordinary use with the painter, in whites, and other delicate colours, also for gold. size and varnish; and with this they polish walking-staves, and other works which are wrought in with burning: They fry with it in some places, and eat it instead of butter in Berry, where they have little or none good; and therefore they plant infinite numbers of these trees all over that country: The use of it to burn in lamps is common there. The younger timber is held to make the better-coloured work, and so the Oak, but the older more firm and close, is finer cambleted for ornament; and the very husks and leaves being macerated in warm water, and that liquor poured on the carpet of walks and bowling-greens, does infallibly kill the worms, without endangering the grass*; not to mention the dye which is made of this lixive, to colour wool, woods, and hair, as of old they used it. The water of the husks is sovereign against all pestilential infections, and that of the leaves to mundify and heal inveterate ulcers. That which is produced of the thick shell, becomes best timber; that of the thinner, better fruit. Columella has sundry excellent rules how to ascertain and accelerate the growth of this tree, and to improve its qualities; and I am assured, that having been grafted on the Ash, though others say no infusion improves it, it thrives exceedingly, becomes a handsome tree, and, what is most estimable, bears its fruit within four years; all which I recommend to the farther industrious. The green husk dried, or the first peeping red buds and leaves reduced to powder, serves instead of pepper, to condite meats and sauces. It is thought better to cudgel off the fruit, when dropping ripe, than to gather it by hand; and that the husk may open, lay them by in a dry room, sometimes turning them with a broom, but without washing, for fear of mouldiness. In Italy they arm the tops of long poles with nails and iron for the purpose, and believe the beating improves the tree; which I no more believe, than I do that discipline would reform a Shrew. Those nuts, which come easily out of

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* There is nothing peculiarly noxious to worms in the bitter decoction of Walnut leaves. Worms cannot bear the application of any thing bitter to their bodies, which is the reason that bitters, such as Gentian, are the best destroyers of worms lodged in the bowels of animals. Worms are seldom observed in the intestines of the human body, excepting in cases where the bile is either weak or deficient.

their husks, should be laid to mellow in heaps, and the rest exposed in the sun, till the shells dry, else they will be apt to perish the kernels: some again preserve them in their own leaves, or in a chest made of Walnut-tree wood, others in sand, especially if you will preserve them for a seminary: Do this in October, and keep them a little moist, that they may spear, to be set early in February. Thus after two years they may be removed at a yard asunder, cutting the tap-root and side branches, but sparing the head; and being two yards high, bud, or remove them immediately. Old nuts are not wholesome till macerated in warm and almost boiling water; but if you lay them in a leaden pot, and bury them in the earth, so as no vermin can attack them, they will keep marvellously plump the whole year about, and may easily be blanched*. In Spain they use to strew the gratings of old and hard nuts, first peeled, into their tarts and other meats. For the oil, one bushel of nuts will yield fifteen pounds of peeled and clear kernels, and that half as much oil, which the sooner it is drawn, is the more in quantity, though the drier the nut, the better in quality; the lees, or marc of the pressing, is excellent to fatten hogs with. After the nuts are beaten down, the leaves should be swept into heaps, and carried away, because their extreme bitterness impairs the ground, and, as I am assured, prejudices the trees: The green husks boiled, make a good colour to dye a dark yellow, without any mixture; and the distillation of its leaves with honey and urine, makes hair spring on bald heads. Besides its use in the famous Salernitan Antidote†, if the kernel, a little, masticated, be applied to the bite of a suspected mad dog, and when it has lain three hours, be cast to poultry, they will die if they eat of it. In Italy, when a countryman finds any pain in his side, he drinks a pint of the fresh oil of this nut, and finds immediate ease. And more famous is the wonderful cure which the fungous substance, separating the lobes of the kernel, pulverized and drank in wine, in a moderate quantity, did perform upon the English army in Ireland afflicted with a Dyfentery, when no other remedy could prevail. The juice of the outward rind of the

NOTES.

* I have kept Filberts quite fresh by burying them some feet under ground in pots, out of the reach of air. The same may probably be done with Walnuts.

† Allia, ruta, pyra, et raphanus, cum theriaca, *nux*,
Præstant antidotum contra lethale venenum.

Schol. Salern.

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nut makes an excellent gargle for a fore throat: The kernel being rubbed upon any crack or chink of a leaky or crazy vessel, stops it better than either clay, pitch, or wax. In France they eat them blanchéd and fresh, with wine and salt, having first cut them out of the shells before they are hardened, with a short broad brass knife, because iron rusts; and these they call Cernois, from their manner of scooping them out. Lastly, of the fungus emerging from the trunk of an old tree, and indeed some others, is made touch-wood, artificially prepared in a lixivium, or lye, dried, and beaten flat, and then boiled with salt-petre, to render it apter to kindle. The tree wounded in the spring, yields a liquor, which makes an artificial wine. For other species, see Mr. Ray's Dendrolog. tom. iii. p. 5, 6.



The White Beam Tree.

J. Miller del & sc

Published Jan^y 1779 by A. Hunter M.D. as the Act directs.

CHAP. X.

The SERVICE*.

1. **SORBUS**, the Service-tree (of which there are four sorts) is raised of the chequers, or berries, which being ripe, that is rotten, about September, and the pulp rubbed off clean from the stones in dry sand, and so kept till after Christmas, may be sown like Beech-mast, and educated in the nursery like the Chestnut. It is reported that the sower never sees the fruit of his labour, either for that it bears only being very old, or that men are commonly so before they think of planting trees: But this is an egregious mistake; for these come very soon to be trees, and, being planted young, thrive exceedingly; I have likewise planted them as big as my arm successfully. The best way is therefore to propa-

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NOTES.

* Of the Wild Service there are numerous species.

1. **CRATÆGUS** (*Aria*) foliis ovatis inæqualiter serratis, subtus tomentosis. Hort. Cliff. 187. *Wild Service with oval leaves unequally sawed, and woolly on their under side.* Cratægus folio subrotundo, ferrato, subtus incano. Tourn. Inst. R. H. 633. Aria. Dalech. Hist. 202. Sorbus Alpina. Bauh. Hist. i. p. 65. *The White Beam, or White-leaf Tree.*

This tree rises to the height of thirty feet, and grows naturally upon the chalky hills of Kent, Surry, and Suffex. The young shoots have a brown bark covered with a mealy down. The leaves are oval, of a light green colour upon their upper side, but white on their under, having many prominent transverse nerves running from the midrib to the border. They are unequally serrated. The flowers are produced at the end of the branches in May. They grow upon mealy foot-stalks, and are succeeded by red berries which ripen in autumn.

2. **CRATÆGUS** (*Torminalis*) foliis cordatis septangulis, lobis infimis divaricatis. Lin. Sp. Plant. 681. *Wild Service with heart-shaped leaves, having seven angles, whose lower lobes spread asunder.* Cratægus foliis cordatis acutis: lacinulis acutis serratis. Hort. Cliff. 187. Mespilus apii folio, Sylvestris non spinosa, seu Sorbus Torminalis. Bauh. Pin. 454. Sorbus Torminalis et Cratægus Theophrasti. Bauh. Hist. i. p. 63. *Wild, or Maple-leaved Service.*

This sort grows naturally in many parts of England, and is chiefly found upon strong soils; it formerly grew in great plenty in Cane-Wood, near Hampstead; and lately there were some young trees growing in Bishop's-Wood, near the same

Book I. gate them of suckers, of which they put forth enough, as also of sets, and may be budded with great improvement. They delight in reasonable good stiff ground, rather inclining to cold than over hot; for in places which are too dry they never bear kindly. The Torminalis (so called for its effects against gripings in the bowels) is the kind most frequent with us; for those of the narrower and less-indented leaf, are not so common in England as in France, bearing a sort of berry of the pear-shape, and is there called the Cormier. This tree may be grafted either on itself or on the White-thorn and Quince. To this we might add the Mespilus or

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place; but in many parts of Hertfordshire there are large trees now growing. It rises to the height of forty or fifty feet, with a large trunk, spreading at the top into many branches, so as to form a large head. The young branches are covered with a purplish bark, marked with white spots, and are garnished with leaves placed alternately, standing on pretty long foot-stalks; these are cut into many acute angles, like those of the Maple-tree, and are near four inches long, and three broad in the middle, having several smaller indentures toward the top, of a bright green on their upper side, but a little woolly on their under. The flowers are produced in large bunches toward the end of the branches; they are white, and shaped like those of the Pear-tree, but smaller, and stand upon longer foot-stalks; these appear in May, and are succeeded by roundish compressed fruit, which are shaped like large Haws, and ripen late in autumn, when they are brown; and if kept till they are soft, in the same way as Medlars, they have an agreeable acid flavour. The fruit of this tree is sold in the London markets in autumn.

3. *CRATÆGUS (Alpina)* foliis oblongo-ovatis serratis, utrinque virentibus. *Wild Service with oblong, oval, sawed leaves, which are green on both sides.* Cratægus folio oblongo, serrato, utrinque virenti. Tourn. Inst. 633.

This species grows naturally upon mount Baldus, and on other mountainous parts of Italy; it rises with a woody trunk about twenty feet high, dividing into many branches, which are covered with a purplish spotted bark, and closely garnished with oblong sawed leaves, standing alternate, on very short foot-stalks; they are about three inches long, and one and a half broad, in the broadest part, lessening toward both ends; they are slightly sawed on their edges, and of a deep green on both sides. The flowers are produced at the end of the branches in small bunches, which have rarely more than four or five flowers in each; they are white, and much smaller than those of the former sort; these are succeeded by fruit about the size of the common Haw, which is of a dark-brown colour when ripe. It flowers in May, and the fruit ripens in Autumn.

4. *CRATÆGUS (Coccinea)* foliis ovatis repando-angulatis serratis glabris. Hor. Cliff. 187. *Wild Service with oval, smooth, sawed leaves, having angles.* Mespilus spi-



The Wild Service Tree. J. Miller del & Sculpt.
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Medlar, being an hard wood, and of which I have seen very beautiful walking-staves. But there is yet a rare kind of Service-tree, frequent in Germany, which we find not in our woods; and they speak of another sort, which bears poison-berries.

2. The timber of the Sorb is useful for the joiner, and of which I have seen a room curiously wainscotted: Also for the engraver of wood cuts; for bows, pulleys, screws, mill and other spindles; for goads to drive oxen with; for pistol and gun-stocks, and for most that the wild Pear-tree serves;

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rosa, Oxyacantha Virginiana maxima. Tourn. Inst. 633. Commonly called *Cockspur Hawthorn*.

The Virginian Cockspur-thorn will grow to about twenty feet high. It rises with an upright stem, irregularly sending forth branches, which are smooth, and of a brownish colour, spotted thinly with small white spots. It is armed with thorns that resemble a Cockspur, which gives it the appellation of Cockspur-thorn. In winter, the leaf-buds appear large, turgid, and have a bold and pleasant look among others of different appearances. In summer, this tree is very delightful. The leaves are oval, angular, serrated, smooth, and bend backwards. They are about four inches long, and three and a half broad; have five or six pair of strong nerves running from the mid-rib to the border; and die to a brownish red colour in the autumn. The flowers are produced in very large umbels, making a noble shew in May, and are succeeded by large fruit, of a bright-red colour, which have a good effect in the winter.—The principal varieties of this species are, the Cockspur-hawthorn with many thorns; the Cockspur-hawthorn with no thorn; the Cockspur with eatable fruit.

5. *CRATÆGUS (Crus Galli)* foliis lanceolato-ovatis serratis glabris, ramis spinosis. Lin. Sp. 682. *Cratægus* with oval, spear-shaped, sawed leaves, and prickly branches. *Mespilus aculeata pyrifolia denticulata splendens, fructu insigni rutilo, Virginienfis.* Pluk. Alm. 249. Commonly called *Virginian L. Azarole*.

This species will grow to be near twenty feet high. The stem is robust, and covered with a light-coloured bark. The branches are produced without order; are of a dark-brown colour, and possessed of a few long sharp thorns. The leaves are spear-shaped, oval, smooth, and serrated; of a thickish consistence, and often remain on the tree the greatest part of the winter. Each separate flower is large; but as few of them grow together, the umbels they form are rather small. They come out in May, and are succeeded by large dark red-coloured fruit, which ripens late in the autumn.

6. *CRATÆGUS (Lucida)* foliis lanceolatis serratis lucidis, spinis longissimis floribus corymbosis. *Cratægus* with lucid, spear-shaped, sawed leaves, very long spines, and

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being of a very delicate grain it serves the turner for divers curiosities, and looks beautifully, and is almost everlasting; when rubbed over with oil of linseed, well boiled, it is made to counterfeit Ebony, or almost any Indian wood, coloured according to art: Also it is taken to build with, yielding beams of considerable substance. The shade is beautiful for walks, and the fruit not unpleasant, especially the second kind, of which, with new wine and honey, they make a conditum of admirable effect to corroborate the stomach; and the fruit alone is good in dysente-

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flowers in a corymbus. Mespilus prunifolia, spinis longissimis fortibus, fructu rubro magno. Flor. Virg. 55.

This kind grows naturally in North America, and rises with a strong stem to the height of ten or twelve feet, sending out many strong irregular branches, which, while young, are covered with a bright-brown bark, but the older branches have it of a lighter colour; the leaves are oval, spear-shaped, slightly sawed on their edges, of a bright-green on their upper side, but paler on their under; sometimes they are placed by pairs, at other times three or four come out from the same joint; the flowers are produced in large clusters toward the end of the branches, forming a sort of corymbus, and are succeeded by roundish fruit of a middling size, and a deep-red colour. As the branches of this sort shoot very strong, and are generally interwoven with each other, being armed with very long strong thorns, it is very proper for outward fences to gardens or fields.

7. *CRATÆGUS (Azarolus) foliis obtusis subtrifidis sub-dentatis. Lin. Sp. Pl. 683. Cratægus with obtuse, trifid, indented leaves. Mespilus Apii folio laciniato. C. B. P. 453. Commonly called L' Azarole.*

This grows naturally in Italy and the Levant, where the fruit is served up to table with the desert; it has a strong stem rising twenty feet high, having many strong irregular branches, covered with a light-coloured bark; the leaves are in shape somewhat like those of the common Hawthorn, but are much larger, have broader lobes, and are of a paler colour; the flowers come out in small clusters from the side of the branches, which are in shape like those of the common Hawthorn, but much larger; as is also the fruit, which when fully ripe has an agreeable acid taste, for which it is esteemed by the inhabitants of the countries where it grows naturally.

8. *CRATÆGUS (Oxyacantha) foliis obtusis subtrifidis serratis. Hort. Cliff. 188. Cratægus with obtuse, trifid, sawed leaves. Mespilus, Apii folio, sylvestris spinosa, f. Oxyacantha. C. B. P. 454. The common White Thorn.*

This admirable and useful species sports in the following varieties: The Large Scarlet Hawthorn; the Yellow Haw; the White Haw; the Maple-leaved Hawthorn; the Double-blossomed Hawthorn; and the Glastonbury Thorn.—The Large Scarlet Hawthorn is no more than a beautiful variety of the Common Haw. It

ries and larks. The water distilled from the stalks of the flowers and leaves in B. M. and twice rectified upon fresh matter, is incomparable for consumptive and tabid bodies, taking an ounce daily at several times: Likewise it cures the green-sickness in virgins, and is prevalent in all

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is exceedingly large, oblong, perfectly smooth, and of a bright scarlet; and, from the additional splendor it acquires by the berries, it is propagated to cause variety in plantations for observation and pleasure.—The Yellow Haw is a most exquisite plant. The buds at their first coming-out in the spring, are of a fine yellow, and the fruit is of the colour of gold. The tree is a great bearer, and retains its fruit all winter, causing a delightful effect in plantations of any kind. It was originally brought from Virginia, is greatly admired, and no collection of hardy trees should be without it.—The White Haw is but a paltry tree, compared with the former. It hardly ever grows to the height of the Common Hawthorn, is an indifferent bearer, and the fruit is small, and a very bad white.—The Maple-leaved Hawthorn will grow to be near twenty feet high, and has very few thorns. The leaves are larger than the Common Hawthorn, resemble those of the Maple, and are of a whitish green colour. The flowers are produced in large bunches, in June, and are succeeded by remarkable fruit, of a shining red, which looks beautiful in the winter.—The Double-blossomed Hawthorn produces a full flower, and is one of the sweetest ornaments in the spring. Nature seems to have peculiarly designed this sort for the pleasure-garden; for tho' it be the Common Hawthorn only, with the flowers doubled, yet it may be kept down to what size the owner pleases; so that it is not only suitable for wilderness-quarters, shrubberies, and the like, but it is also useful for small gardens, where a tree or two only are admitted. These beautiful double flowers come out in large bunches, in May, and the tree is so good a bearer, that it will often appear covered with them. Their colour, at their first appearance, is a delicate white: They afterwards die to a faint red colour, and are frequently succeeded by small imperfect fruit.—The Glastonbury Thorn differs in no respect from the Common Hawthorn, only that it sometimes flowers in the winter. It is said to have been originally the staff of Joseph of Arimathea, that noble counsellor who buried Christ. He, according to the tradition of the abbey of Glastonbury, attended by twelve companions, came over into Britain, and founded, in honour of the Blessed Virgin, the first Christian Church in this island. As a proof of his mission, he is said to have stuck his staff into the ground, which immediately shot forth and blossomed. By some credulous deluded people this tree was long thought to put forth its blossoms on Christmas-day, but, to the honour of true religion, this sanctified deceit is now sunk into discredit, even with the meanest of the vulgar.

9. *CRATÆGUS (Tomentosa)* foliis cuneiformi-ovatis serratis subangulatis subtus villosis, ramis spinosis. Lin. Sp. 682. *Cratægus* with oval, wedge-shaped, sawed, angular

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fluxes; distilled warm into the ears, it abates the pain; the wood or bark contused, and applied to any green wound, heals it; and the powder thereof drank in olive oil consolidates inward ruptures: Lastly, the salt of the wood, taken in decoction of althæa to three grains, is an incom-

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leaves, hoary on their under side, and prickly branches. *Mespilus Virginiana*, *grossulariæ foliis.* Pluk. Phyt. 100. f. 1.

This sort grows naturally in North-America; it has a slender shrubby stalk, rising about six or seven feet high, sending out many irregular branches, armed with long slender thorns, and garnished with short, oval, wedge-shaped leaves, which are sawed on their edges, and are woolly on their under side; the flowers are small, proceeding from the side of the branches, standing sometimes single, and at other times two or three upon the same foot-stalk, having large leafy empalements, and are succeeded by small roundish fruit, with a large leafy umbilicus, which before was the empalement of the flower: the flowers appear the beginning of June, and the fruit ripens very late in the autumn.

All these species are propagated by sowing of the seeds; and the varieties are continued by budding them upon stocks of the white thorn.—In order to raise them from seeds, it is, by some, advised to sow them soon after they are ripe, in beds of fresh, light, rich earth. Let alleys be left between the beds, for the convenience of weeding, and let the seeds be covered over with fine mould, about an inch deep. The summer following, the beds must be kept clean of weeds, and probably some few plants will appear: But this is not common in any of the sorts; for they generally lie till the second spring after sowing before they come up. At the time they make their appearance they must be watered, if the weather proves dry; and this should be occasionally repeated all summer. They should also be constantly kept clean from weeds; and in the autumn the strongest may be drawn out, and set in the nursery-ground, a foot asunder, in rows two feet distant from each other; while the weakest may remain until another year.—During the time they are in the nursery, the ground between the rows should be dug every winter, and the weeds constantly hoed down in the summer; and this is all the trouble they will require until they are planted out for good, which may be in two, three, or more years, at the pleasure of the owner, or according to the purposes for which they are wanted.—I rather recommend them to be raised as the Common Haw in the following manner: The Common Haw, used for our fences in England, should, as soon as gathered, be buried in a dry trench in the month of October. To prevent their being heated, it will be proper to pick off any leaves that may have been gathered with them; and for the same reason they should not lie above a foot thick in the trench. In this bed they should remain two winters and one summer. In the second spring they will begin to sprout when they should be sown in beds, and kept clear from weeds. Some of those plants will be of size to plant out for hedges the first year, and, in the north of England, will sell for four shillings per thousand; but it is much more judicious to draw them from the seed-bed and transplant them

parable remedy to break and expel gravel *. The Service gives the Husbandman an early presage of the approaching spring, by extending its adorned buds for a peculiar entertainment, and dares peep out in the severest winters.

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into the nursery at four inches distance from each other. There they should remain two years, at the expiration of which time they will have got good roots. Such plants are cheaper at twelve shillings a thousand than those from the seed-bed at half a crown. To this observation I earnestly request the attention of all persons engaged in making inclosures.

In the Linnaean System the *Cratægus*, or Wild Service, is of the class and order *Icosandria Digenia*, the flower having twenty or more stamens and two styles.

* The fixed alkaline salt, produced from burnt vegetables, is similar in its nature and effects, whether made from the ashes of the Service-tree, the Oak, the Ash, or any other vegetable body. Such salts are generally supposed, by Physicians, to be dissolvers of the stone, and capable of preventing the attraction of the stony particles towards each other, whereby the formation of gravel in the kidneys is prevented.

CHAP. XI.

The BLACK CHERRY*.

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IRank this amongst the forest berry-bearing trees, (frequent in the hedges, and growing wild in Herefordshire, and many places; for I speak not here of our orchard Cherries, said to have been brought into Kent out of Flanders by Henry VIII.) chiefly from the suffrage of that industrious planter, Mr. Cooke, from whose ingenuity and experience (as well as out of gratitude for his frequent mentioning of me in his elaborate and useful work) I acknowledge to have benefited myself; though I have also given no obscure taste of this pretty tree in chap. xxi.

It is raised of the stones of Black Cherries very ripe, (as they are in July) endeavouring to procure such as are full and large; whereof some, he tells us, are a little inferior to the Black Orleance, without grafting, and from the very genius of the ground. These gathered, the fleshy part is to be taken off by rolling them under a plank in dry sand; and when the humidity is off (as it will be in three or four days) reserve them in sand again, a little moist and housed, till the beginning of February, when you may sow them in a light gravelly mould, keeping them clean for two years, and thence planting them into your nurseries to raise other kinds upon, or for woods, copses, and hedge-rows, and for walks and avenues, which, if of a dryish soil, mixt with loam, though the bottom be gravel, will thrive into stately trees, beautified with blossoms of a surprising whiteness, greatly relieving the sedulous bees, and attracting birds.

NOTES.

* The Wild Cherry-tree is titled *Prunus umbellis subpedunculatis, foliis ovato-lanceolatis conduplicatis glabris*. Sp. Pl. 679. J. Bauhine calls it *Cerasus Sylvestris, fructu nigro et rubro*. In the Linnæan System, it belongs to the class and order *Icosandria Monogynia*, having twenty or more stamens, and only one style.

This tree is very proper to plant in parks, because it grows to a large size, and makes a beautiful appearance. In the spring, when in full flower, it is highly ornamental. It thrives in poor land much better than most other sorts. The French often plant it for avenues to their houses. They also cultivate it in their woods for hoops, for which purpose they esteem it much. The stones of the Wild Cherry are generally sown for raising stocks to graft, or bud, the other sorts of Cherries upon, being of a quick growth, and considerable duration.



The wild Black Cherry Tree
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J. Miller del. & sc.

If you sow them in beds immediately after they are excarnated, they CHAP. XX
will appear the following spring, and then, at two years shoot, be fit to
plant out where you please; otherwife, being kept too long e'er you sow
them, they will sleep two winters: And this is a rule which he prescribes
for all sorts of stone-fruit.

You may almost at any time remove young Cherry-trees, abating the
heads to a single shoot.

He recommends it for the copse, as producing a strong shoot, and as
apt to put forth from the roots as the Elm, especially if you fell lusty
trees: In light ground it will increase to a goodly tall tree, of which he
mentions one that held above eighty-five feet in height. I have myself
planted of them, and imparted to my friends, which have thrived exceed-
ingly; but till now did not insert it among the foresters: The virtues of
the fruit of this Cherry-tree against the epilepsy, palsy, and convulsions,
are in the spirits and distilled waters. Concerning its other uses, see the
chapter above-mentioned. This tree affords excellent stocks for the bud-
ding and grafting of other Cherries on.

And here I might mention the Bitter Cherry of Canada, (though ex-
ceedingly unlike to ours) which should yet be propagated for the incom-
parable liquor it is said to yield, preferable to the best limonade, by an
incision of two inches deep in the stem, and sloping to the length of a
foot, without prejudice to the tree. What is said of it, and of the Ma-
ple, in the late discovery of the North-America, may be seen in the late
description of those countries. For other exotic species, vide Raii Den-
drolog. tom. iii. p. 45. - 46.

C H A P. XII.

The MAPLE.

Book I. 11. **A**CER MINUS, the Maple, (of which authors reckon many kinds) was of old held in equal estimation almost with the Citron, especially the Bruscum, the French Maple, and the Pavonaceous, Peacock's-tail Maple, which is that sort so elegantly undulated, and crisped into variety of curls, as emulates the famous Citria. It were a most laudable attempt, if some would enquire out, and try the planting of such sorts as are not indigenous amongst us; as is especially the German Aier, and that of Virginia, not yet cultivated here, but an excellent tree: And if this were extended likewise to other timber and exotic trees, it would prove of extraordinary benefit and ornament to the public, and were worthy even of the royal care. They are all produced of seeds contained in the folliacles and keys, or birds-tongues (as they are called) like the Ash (after a year's interment) and, like to it, affect a found and a dry mould, growing both in woods and hedge-rows, especially in the latter; which,

N O T E S.

* Of the Maple there are various species.

I. ACER (*Pseudo-Platanus*) foliis quinquelobis inæqualiter ferratis, floribus racemosis. Lin. Sp. Pl. 1495. *The greater Maple, or Sycamore-tree.*

This is a large-growing tree, and adapted to encrease the variety in our woods and fields. It is very proper, if kept down, for underwood, because it shoots very fast from the stool and makes excellent fuel.—There is no tree more proper than this to form large plantations near the sea; for the spray, which is prejudicial to most trees, seems to have no bad effect upon it.—The Sycamore is not only a large timber-tree, but will stand long on the soil before it decays. This may be seen from what St. Hierom says, who lived in the fourth century after Christ, namely, That he saw the Sycamore-tree which Zaccheus climbed up, to see our Saviour ride in triumph to Jerusalem.—The propagation of the Sycamore is very easy. In the autumn, when the keys are ripe, they may be gathered, and in a few days after sown, as has been directed for the Ash.—In the spring the plants will appear, and make a shoot of about a foot and a half by the autumn following, if the ground of the seminary be tolerably good, and they are kept clean from weeds. The spring after they come up, they should be planted in the nursery, in rows two feet and a half asunder, and their distance in the rows must be one foot and a half. Here they may remain till they are big enough to plant out for good, with no farther trouble than taking off unsightly side-branches, and



The common Maple Tree.

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J. Miller del & sc.

if rather hilly than low, affords the fairest timber. It is also propagated by layers and suckers. By shredding up the boughs to a head, I have caused it to shoot to a wonderful height in a little time; but if you will lop it for the fire, let it be done in January; and indeed it is observed to be of noxious influence to the subnascent plants of other kinds, by reason of a clammy dew, which it sheds upon them; and therefore they should not be indulged in Pollards or spreading trees, but to thicken underwoods and copses. The timber is far superior to Beech for all uses of the turner, who seeks it for dishes, cups, trays, trenchers, &c. as the joiner for tables, inlayings, and for the delicateness of the grain, when the knurs and nodosities are rarely diapered, which does much advance its price: Our turners will work it so thin, that it is almost transparent. It is

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such as have a tendency to make the tree forked, except digging between the rows, which must always be done every winter.

2. ACER (*Campestre*) foliis lobatis obtusis emarginatis. Fl. Suec. 925. Acer Campestre et minus. C. B. P. 431. *The small, or common Maple.*

This does not grow to such a large size as the Sycamore, though its timber is of greater value.—We meet with high encomiums on this wood among the ancients: Pliny gives us many; and Virgil introduces Evander sitting on a Maple throne. The first-mentioned author highly commends the Maples growing in different parts of the world, and extols many of them for the remarkable fineness of their grain: Indeed the fineness of the grain ever governs the value of the wood. In former times, so mad were people in searching for the Bruscum of this tree, which often formed the exact representation of birds, beasts, &c. that they spared no expence in procuring it to be made up into such little ornaments as best pleased their taste. But when boards, big enough for tables, were found of this curious part of the wood, the extravagance of purchasers was incredible. We read of a table which cost ten thousand sesterces, and of another that fetched fifteen thousand; nay, of one which sold for its weight in gold.—The Maple is seldom planted in such quantities together as to form woods; but where they appear in plantations, they are generally cut down for underwood; for which purpose they answer extremely well, as they shoot away from their stools very fast, and make tolerable fuel.—The largest trees are generally found in hedge-rows, where they are occasionally to be met with all over the kingdom. The timber with us is deemed excellent, and is used for several curious purposes, such as musical instruments, inlayings, &c. For the making of turnery ware also, such as dishes, bowls, trays, &c. it is superior to most other wood.—The flower-buds of the Maple begin to open about the sixth of April, and the leaves are out about the eighteenth. The flowers are in full blow about the eleventh of May, and the seeds are ripe in the autumn.—If a quantity of these trees are

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commended for its lightness, under the name Aier, and employed often by those who make musical instruments; that especially which grows in Friuli, Carniola, and Saltzburglandt. There is a larger sort which we call the Sycamore.

2. Pliny's description of this lesser Maple, and the antient value of it, is worth the citing. *Acer operum elegantia & subtilitate Cedro secundum. Plura ejus genera. Album quod præcipui candoris, vocatur Gallicum in Transpadana Italia, transque Alpes nascens. Alterum genus crispo macularum discursu, qui cum excellentior fuit, a similitudine caudæ pavonum nomen accepit.* "The Maple, for the elegancy and fineness of the wood, is next to the very Cedar itself. There are several kinds of it, especially the White, which

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wanted, they may be raised in the same manner as the Sycamore, and managed accordingly.

3. ACER (*Negundo*) foliis compositis, floribus racemosis. Hort. Cliff. 144. *The Virginia Ash-leaved Maple.* Acer maximum, foliis trifidis vel quinquefidis, Virginia-num. Pluk. Alm.

This is a quick grower, arrives to a large timber-tree, and is admirably adapted to cause a beautiful variety in our woods, though it is not proper to be planted in exposed places, the branches being subject to split when attacked by violent winds. The leaves are of a pale green colour, moderately large, and fall off pretty early in the autumn.—The timber is extremely useful for turners; and, like the Norway Maple, serves all the purposes of the Sycamore.—It is propagated by saving the keys, which this tree, though a native of Virginia, perfects in our country.—It is also propagated by layers, or by planting the cuttings, in a moist situation, in the autumn.

4. ACER (*Platanoides*) foliis quinquelobis acuminatis acutè dentatis glabris, floribus corymbosis. Lin. Flor. Suec. 303. *The Norway Maple with Plane-tree leaves.*

This Maple will grow to a great timber-tree, and therefore should be raised to encrease the variety in our plantations. The leaves are of a shining green colour, look beautiful all summer, and die to a golden yellow in the autumn. This tree perfects its seeds with us; so that it may be raised in the same manner as the Sycamore, from the keys. It may be also propagated by layers and by cuttings, which, if planted in a moist soil in the autumn, will grow. These should be ordered in the nursery-way, as was before directed, and managed till they are of a sufficient size to be planted out for good.—These trees being scarce, have been hitherto seldom planted, unless in wilderness-quarters for ornament. But as it is a very quick grower, arrives at a great bulk, and answers all the purposes of the Sycamore, the raising it, even for this use, as well as ornament and variety,

“is wonderfully beautiful; this is called the French Maple, and grows in CH. XII.
 “that part of Italy that is on the other side of the Po beyond the Alps;
 “the other has a curled grain, so curiously maculated, that, from a near
 “resemblance, it was usually called the Peacock’s Tail.” He goes on to
 commend that of Istria, and that growing on the mountains, for the best:
 In the next chapter, he says, *Pulcherrimum vero est Bruscum, multoque ex-*
cellentius etiamnum Molluscum. Tuber utrumque arboris ejus: Bruscum intorsius
crispum: Molluscum simplicius sparsum. Et si magnitudinem mensarum caperet,
haud dubie praeferretur Cedro. Nunc intra pugillares, lectorumque silicios, aut
laminas, raro usu spectatur. E Brusco fiunt et mensae nigrescentes. lib. xvi.
 cap. xv. xvi. “The Bruscum, or Knur, is wonderfully fair, but the
 “Molluscum is counted most precious; both of them knobs and swellings

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should not be neglected.—The Norway Maple is reckoned among our best trees
 for sheltering habitations.

5. *ACER (Rubrum)* foliis quinquelobis subdentatis subtus glaucis, pedunculis simplicifimis aggregatis. Lin. Sp. Plant. 1496. *The scarlet-flowering Maple of Virginia.*
Acer Virginianum folio majore, subtus argenteo supra viridi splendente. Pluk. Alm. 7.

Of this there are two sorts; 1. Virginian Scarlet-flowering Maple; and, 2. Sir Charles Wager’s Maple. Both of these are propagated for the sake of the flowers, which are of a scarlet colour, and come out early in the spring. The leaves are composed each of five sharp-pointed lobes, which are slightly indented or serrated: They are smooth, of a pale green on their upper surface, glaucous underneath; and they grow on long, simple, taper, reddish foot-stalks. The flowers come out in clusters from the side of the branches; and the botanic characters, which follow their titles, indicate their structure. They appear in April, and the seeds ripen in June. The sort called Sir Charles Wager’s produces larger clusters or flowers than the others; on which account it is in most esteem.

6. *ACER (Saccharinum)* foliis quinquepartito-palmatis acuminato-dentatis. Lin. Sp. Plant. 1496. *The American Sugar Maple.*

This has some resemblance to the Norway Maple when the plants are young; but as they grow up the leaves are more deeply divided, and their surfaces less smooth, so that they are then easily distinguished. From this tree the inhabitants of North America make a very good sort of sugar, in large quantities, by tapping the trees early in the spring, and boiling the juice, which, by the usual process, is converted into sugar. I am of opinion, that the people in America make sugar from more than one sort of Maple; for I have found that the Ash-leaved Maple abounds with a saccharine juice, in as great plenty as any other sort. Mr. Ray and Dr. Lister prepared a tolerable sort of sugar from our greater Maple, by tapping the trees in their bleeding season; and I have observed, upon cutting off

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“out of the tree. The Bruscum is more intricately crisped, the Molluscum not so much; and had we trees large enough to saw into planks for tables, it would be preferred before Cedar (or Citron, for so some copies read it); but now they use it only for small table-books, and, with its thin boards, to wainscot bed-testers with. The Bruscum is of a blackish kind, with which they make tables.” Thus far Pliny.—And such spotted tables were the famous Tigrin and Pantherine curiosities; not so called from being supported with figures carved like those beasts, as some conceive, and was in use even in our grandfathers’ days, but from the natural spots and maculations; *Hem, quantis facultatibus aestimare lignæ maculas!* as Tertullian cries out, de Pallio, cap. v. Such a table was that of Cicero, which cost him ten thousand sesterces; such another had Aſinius

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‘branches’ from the Scarlet Maple in February, a great quantity of a very sweet juice hath flowed out for several days together

7. ACER (*Pensylvanicum*) foliis trilobis acuminatis serrulatis, floribus racemosis. Duham. Arb. *The Mountain Maple of America.*

The body of this tree is slender, and is covered with a whitish bark. It sends forth several red branches, and grows about fifteen feet high. The leaves are three-lobed, pointed, and are unequally and sharply serrated. The flowers come out in longish bunches in the spring; they are of a greenish yellow colour, and are succeeded by seeds which (like those of the Norway Maple) generally fall off before they are ripe.

8. ACER (*Opalus*) foliis lobatis, minimè incisis, fructu racemoso. *The Italian Maple*, commonly called *Opalus*. Acer majus folio rotundiore minùs laciniato & Opalus Italarum. Raii Hist.

This is very common in most parts of Italy, but particularly about Rome, where it is one of the largest trees of that county, and is esteemed for the size of the leaves, which are large, affording a great shade; so that these trees are frequently planted by the sides of roads, and near habitations. In England this tree is very rarely to be met with, though it is hardy enough to bear the open air; but as the seeds have not been brought over till lately, there are no large plants in the English gardens at present.

9. ACER (*Montepellulanum*) foliis trilobis integerrimis glabris Prod. Leyd. 459. *The Montpellier Maple*. Acer trifolium. C. B. P. 431.

The Montpellier Maple grows to about twenty feet high, and is a very beautiful tree. The leaves are composed of three lobes, are of a shining green, a thickish substance, and retain their verdure later in the year than most of the other sorts. The flowers come out in the spring, but have very little beauty; their blow is

Gallus. That of King Juba was sold for fifteen thousand, and another, CH. XII.
 which I read of, valued at an hundred and forty thousand, H. S. which,
 at about threepence sterling, arrives to a pretty sum; and yet that of the
 Mauritanian Ptolemie was far richer, containing four feet and an half dia-
 meter, three inches thick, which is reported to have been-fold for its weight
 in gold: Of that value they were, and so madly luxurious the age, that
 when they at any time reproached their wives for their wanton expensive-
 nefs in pearl and other rich trifles, they were wont to retort, and turn the

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Soon over, and sometimes they are succeeded by seeds which come to perfection
 in our gardens.

10. ACER (*Creticum*) foliis trilobis integerrimis subtus pubescentibus. *Cretan*
Maple with three entire lobes to the leaves, which are somewhat hairy on their under-side.

This grows to about the height of the former. The leaves are downy, composed
 of three lobes, and grow opposite to each other on long downy foot-stalks. The
 flowers come out in the spring, and are very seldom succeeded by good seeds in
 England.

The Maple, in the Linnæan System, is of the class and order *Polygamia Monoecia*.

I have already observed that the common Maple and Sycamore are best raised from
 seed; but as the seeds of the foreign kinds do not ripen in this country, they should be
 procured from abroad.—In a cool and shady part of the seminary let beds of fine
 mould be marked out about four feet in breadth, and with proper alleys. Upon these
 let the foreign seeds be regularly sown, sifting over them about half an inch of the
 finest mould. When the plants come up, they should be kept clean from weeds, and
 frequently watered; and this work must be duly attended to all summer. The spring
 following, the strongest may be drawn out, and planted in the nursery, in rows two
 feet asunder, and at the distance of a foot from each other in the rows, leaving the
 others in the seminary to gain strength. The succeeding spring they must receive the
 same culture; and they may remain in the nursery, with no other trouble than keep-
 ing the ground clean from weeds in the summer, digging between the rows in the
 winter, and taking off all strong and irregular side-shoots, till they are planted out
 for good.

Notwithstanding these are the general laws of raising all the species of Maple from
 foreign seeds, the culture varies with respect to the Scarlet-flowering kind, when
 the seeds are gathered at home. This species brings its seeds to maturity the begin-
 ning of June in our gardens. They should be then gathered, and after having lain a
 few days to harden, they should be sown in beds of the finest mould, and covered
 only a quarter of an inch deep. The beds should be hooped, and covered with
 mats in scorching weather; but when it is rainy and cloudy they should always be
 uncovered. In about a month or six weeks many of the plants will appear; but the

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tables upon their husbands. The knot of the timber was the most esteemed, and is said to be much resembled by the Female Cypress: We have now, I am almost persuaded, as beautiful planks of some Walnut-trees near the root; and of Yew, Ivy, Rosewood, Ash, Thorn, and Olive, I have seen incomparable pieces, but the great art was in the seasoning and politure; for which last, the rubbing with a man's hand, who came warm out of the bath, was accounted better than any cloth, as Pliny reports. Some there be who contend, this Citron was a part near the root of the Cedar, which, as they describe it, is oriental and very odoriferous; but most of the learned favour the Citron, and that it grew not far from our Tangier,

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far greatest part will not come up till the following spring. When the summer-plants first shew themselves, they should hardly ever feel the full beams of the sun. The seeds must be constantly covered with the mats in the day-time, unless cloudy and rainy weather happens, when they should always be uncovered; during the night no mats must be put over the plants, that they may have all the benefit of the refreshing dews, air, and cooling showers. When these latter do not fall, watering must be duly attended to; and this is all the trouble they will require for the first summer in the seed-bed. The summer following they may be exposed to all weather, when they will only require being kept clean from weeds, and watered in dry seasons. The succeeding spring the strongest may be set out in the nursery-way, like the former seedlings.

By layers also all the species of this genus may be propagated; though that method is never practised for the Common Maple and the Sycamore. The young shoots may be laid down in the autumn, winter, or early in the spring. By the autumn following they will have struck root, and become good plants; when the strongest should be set out in the places where they are to remain; whilst the weakest may be planted in the nursery, like the seedlings, for a year or two, to gain strength.

Maples raised from seeds will grow faster, and arrive at greater height, than those raised from layers; but they will not produce such quantities of flowers; which makes the latter method more eligible for those who want these plants for a low shrubbery.

By cuttings also these trees may be propagated; But this method is chiefly practised on the Ash-leaved and Norway Maples, which more readily take root this way. The cuttings should be the bottom parts of the last year's shoots: They should be taken off early in October, and planted in rows in a moist shady place. The spring and summer following they must be duly watered as often as dry weather makes it necessary, and be kept clean from weeds. By the autumn they will be fit to remove into the nursery; though if the cuttings are not planted too close, they may remain in their situation for a year or two longer, and then be set out for good, without the trouble of previously planting them in the nursery.

Maples may likewise be propagated by budding, grafting, and inarching: But the other methods being more eligible, these are never practised, except for the variegated sorts, especially the large broad-leaved kind. This latter is to be continued no other-

about the foot of Mount Atlas, whence haply some industrious person might procure of it from the Moors; and I did not forget to put his then Excellency my Lord H. Howard (since his Grace the Duke of Norfolk) in mind of it; who I hoped might have opportunities of satisfying our curiosity, that by comparing it with those elegant woods, which both our own Countries and the Indies furnish, we might pronounce something in the controversy: But his not going so far into the country, and the disorder which happened at his being there, quite frustrated this expectation. Here I think good to add, what honest Palissy philosophises, after his plain manner, about the reason of those pretty undulations and chamfers, which we so frequently find in divers woods, which he takes to be the descent, as well as ascent of moisture: For what else, says he, becomes of that

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wife than by budding it on stocks of the Common Sycamore; for the seeds, tho' so large themselves, when sown afford us only the Common Sycamore in return.

In order to propagate the varieties by budding, let some plants of the Common Sycamore, one year old, be taken out of the seminary, and set in the nursery in rows a yard asunder, and the plants about a foot and half distance from each other in the rows: Let the ground be kept clean from weeds all summer, and be dug, or, as the gardeners call it, *turned in*, in the winter; and the summer following the stocks will be of a proper size to receive the buds, which should be taken from the most beautifully-striped branches. The best time for this work is August; because if it is done earlier, the buds will shoot the same summer; and when this happens, a hard winter will infallibly kill them. Having, therefore, budded your stocks the middle or latter end of August, with the eyes or buds fronting the north, early in October take off the bass matting, which before this time will have confined the bark and pinched the bud, but not so as to hurt it much. Then cut off the stock just above the bud, and dig the ground between the rows. The summer following, keep the ground clean from weeds; cut off all natural side-buds from the stock as they come out; and by autumn, if the land be good, your buds will have shot forth, and formed themselves into trees five or six feet high. They may be then removed into the places where they are designed to remain; or a few of them only may be drawn out, leaving the others to be trained up for larger standards, to serve for planting out in open places, or such other purposes as shall be wanted.

The Striped Norway Maple should be budded on stocks of its own kind; for on these they take best, and both kinds are not very liable to run away from their colours. Variegated plants in general must be planted in poor, hungry, gravelly, or sandy soils, to feed the disease which occasions these beautiful stripes, and cause it to be more powerful; but these trees shew their stripes in greater perfection in a good soil: The plant, though in sickness, has the appearance of health; the shoots are vigorous and strong; the leaves are large, less liable to be hurt by insects; and the stripes appear more perfect, natural, and delightful, than those on stunted trees growing on a poor soil.

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water which we often encounter in the cavities, when many branches divaricate, and spread themselves at the tops of great trees, especially Pollards, unless, according to its natural appetite, it sink into the very body of the stem through the pores? For example; in the Walnut, you shall find, when it is old, that the wood is admirably figured, and, as it were, marbled; and therefore much more esteemed by the joiners, cabinet-makers, inlayers, &c. than the young, which is paler of colour, and without any notable grain, as they call it: For the rain distilling along the branches, when many of them break out into clusters from the stem, sinks in, and is the cause of these marks, since we find it exceedingly full of pores: Do but plane off a thin chip, or sliver, from one of these old trees, and interposing it betwixt your eye and the light, you shall observe it to be full of innumerable holes. (much more perspicuous and ample by the application of a good microscope*.) But above all, notable for these extravagant damaskings and characters, is the Maple; and it is notorious that this tree is very full of branches from the root to its very summit, by reason that it produces no considerable fruit: These arms being frequently cut, the head is more surcharged with them, which spreading like so many rays from a centre, form that hollowness at the top of the stem whence they shoot, capable of containing a good quantity of water every time it rains; this sinking into the pores, as was before hinted, is compelled to divert its course as it passes through the body of the tree, wherever it encounters the knot of any of those branches which were cut off from the stem; because their roots not only deeply penetrate towards the heart, but are likewise of themselves very hard and impervious; and the frequent obliquity of this course of the subsiding moisture, by reason of these obstructions, is, as may be conceived, the cause of those curious works which we find remarkable in this and other woods, whose branches grow thick from the stem. But for these curious contextures, consult rather the learned Dr. Grew. We have shewed how by culture, and stripping up, it arrives to a goodly tree; and surely there were some of them of large bulk, and noble shade, that Virgil should choose it for the court of his Evander (one of his worthiest Princes, in his best of poems) sitting in his Maple-throne*; and when he brings Æneas into the Royal Cottage,

* Not invented in Palissy's days.

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* ——— Soliloque invitat acerno.

ÆN. viii.

he makes him this memorable compliment: Greater, says great Cowley, CH. XII.
 than ever was yet spoken at the Escorial, the Louvre, or Whitehall. }

———Hæc, inquit, limina victor

Alcides subiit; hæc illum regia cepit.

Aude, hospes, contemnere opes, et te quoque dignum

Finge Deo, rebusque veni non asper egenis.

This humble roof, this rustick court, said he,

Receiv'd Alcides crown'd with victory:

Scorn not, great guest, the steps where he has trod,

But contemn wealth, and imitate a God.

The Savages in Canada, when the sap rises in the Maple, by an incision in the tree extract the liquor; and having evaporated a reasonable quantity thereof (as suppose seven or eight pounds) there will remain one pound as sweet and perfect sugar as that which is gotten out of the cane; part of which sugar has been for many years constantly sent to Rouen in Normandy to be refined: There is also made of this sugar an excellent syrup of Maiden-hair and other capillary plants, prevalent against the scurvy; tho' Mr. Ray thinks otherwise, by reason of the saccharine substance remaining in the decoction. See Synopf. Stirp. & Dendrolog. de Acere.

C H A P. XIII.

The SYCAMORE*.

Book I.

1. **T**HE SYCAMORE, or Wild Fig-tree, falsely so called, is our *Acer majus*, or broad-leaved Mas, one of the Maples, and is much more in reputation for its shade than it deserves; for the Honeydew leaves, which fall early, like those of the Ash, turn to mucilage and noxious insects, and putrefy with the first moisture of the season, so as they contaminate and mar our walks; and are therefore, by my consent, to be banished from all curious gardens and avenues. It is raised of the keys in the husk, as soon as ripe, and they come up the first spring; also by roots and layers, in ground moist, not over wet or stiff, and must be governed as other nursery plants.

2. There is in Germany a better sort of Sycamore than ours (nor are ours indigenous) wherewith they make saddle-trees, and divers other things of use. Our own is excellent for trenchers, cart and plow-timber, being light, tough, and not much inferior to Ash itself; and if the trees be very tall and handsome, they are the more tolerable for distant walks, especially where other better trees prosper not so well, or where a sudden shade is expected: Some commend them to thicken copses, especially in parks, as least apt to the spoil of deer, and that it is good fire-wood. This tree being wounded, bleeds a great part of the year; the liquor emulating that of the Birch, which happening to few of the rest (that is, to bleed winter and summer) I therefore mention: The sap is sweet and wholesome, and in a short time yields sufficient quantity to brew with, so as with one bushel of malt is made as good ale as four bushels with ordinary water, upon Dr. Tongue's experience. Phil. Transf. vol. iv. fol. 917.

N O T E S.

* This is the *Acer* (*Pseudo-platanus*) foliis quinquelobis inæqualiter serratis, floribus racemosis. Lin. Sp. Pl. 1495. And has already been described in the last chapter.



The Sycamore Tree.

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J. Miller del. & Sc.



The Lime Tree.

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J. Miller del et sculp.

C H A P. XIV.

The LIME.*

1. **TILIA**, the Lime-tree, or Linden, is of two kinds; the male CH. XIV.
 (which some allow to be but a finer sort of Maple) is harder, fuller of knots, and of a redder colour, but producing neither flower nor seed, so constantly and so mature with us, as does the female, whose blossom is also very odoriferous, perfuming the air, and the leaf larger; the wood is likewise thicker, of small pith, and not obnoxious to the worm; so as it seems Theophrastus de Plant. lib. iii. cap. x. said true, That though they were of both sexes, yet they totally differed as to their form, διαφέρουσι δὲ τῇ μορφῇ τῇ ὄλῃ, &c. We send commonly for this tree into Flanders and Holland, which indeed grows not so naturally wild with us, to our excessive cost, while our woods do in some places spontaneously produce them; and though of somewhat a smaller leaf, yet

N O T E S.

* Of this genus there are only two species.

1. **TILIA** (*Europæa*) floribus nectario destitutis. Lin. Sp. Pl. 733. *The Lime, or Linden-tree.*

The Common Lime and the Red-twigg'd Lime are varieties only of the same species, because the seeds of one sort will frequently produce the other. Thus, seeds gathered from the red-twigg'd trees frequently produce plants of the common sort; and those that have come up the true red-twigg'd kind, and have been raised and planted out as such, have been found to run away from their colours, and change into the common green-twigg'd sort.—The Lime is a handsome picturesque tree, forming a beautiful cone by its branches, and maintaining its body taper and straight; and, as it will grow to a large size, it is very proper to be planted for avenues, to terminate the bounds of lawns, and to make a variety in places designed for relaxation of mind. And although the leaves fall off very early in the autumn, yet it immediately makes amends for this by exhibiting its beautiful red twigs; for which reason the red-twigg'd Lime should always be preferred for these purposes. It has also other properties to recommend itself to such situations: The shade is excellent; the branches are so tough as seldom to be broke by the winds; and if any of them should want occasionally to be taken off, no tree heals its wounds sooner. Notwithstanding it will sometimes run away from its colour, and grow with green branches, this is not often the case.—The Lime is best raised from seeds; for those trees raised from layers or from cuttings

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altogether as good, and apt to be civilized and made more florid: From thence I have received many of their berries; so as it is a shameful negligence, that we are not better provided of nurseries of a tree so choice and universally acceptable: For so they may be raised either of the seeds in October, or, with better success, by the suckers and plants, which are treated after the same method, and in as great abundance as the Elm, like to which it should be cultivated. You may know whether the seeds be prolific, by searching the husk; if on biting, or cutting it asunder, it be full and white, and not husky, as sometimes we find the foreigners, the seeds are good. Be sure to collect your seed in dry weather, airing it in an open room, and reserving it in sand (as has been taught) till Mid-February, when you may sow it in pretty strong, fresh, and loamy mould, kept shaded and moist, as the season requires, and clear of weeds; and at the period of two years plant them out, dressed and pruned, as discretion shall advise. But not only by the suckers and layers at the roots, but even by branches lopped from the head, may this tree be propagated; and peeling off a little of the bark, at a competent distance from the stem or arms, and covering it with loam mingled with rich earth, they will

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never grow so handsome, or so fast, as those raised in the seminary.—Let the seeds be gathered from thriving healthy trees of the true red-twigg'd kind, and then by far the greatest part of the young plants will be of that sort. The seeds being ripe in October, let a dry day be made choice of for gathering them. As these grow at the extremity of the branches, it would be tedious to gather them with the hand; they may therefore be beaten down by a long pole, having a large winnowing sheet, or some such thing, spread under the tree to receive them.—When you have got a sufficient quantity, spread them in a dry place for a few days; then having procured a spot of rich garden-ground, and having the mould made fine by digging and raking, let it be raked out of the beds about an inch deep: These beds may be four feet wide, and the alleys a foot and a half. After the mould is raked out, the earth should be gently tapped down with the back of the spade, to make it level; then the seeds should be sown, at about an inch asunder, all over the bed, gently pressing them down, and covering them about an inch deep.—In the spring of the year the young plants will make their appearance; when they should be constantly kept clean from weeds, and gently watered in very dry weather. In this seminary they may stand for two years, when they will be fit to plant in the nursery; at which time they should be carefully taken up, their roots shortened, and the young side-branches, if they have shot out any, taken off. They must be planted in the nursery-ground in rows, two feet and a half asunder, and one foot and a half distant in the rows. There they may stand till they are of proper size to be planted out for good; observing always

shoot their fibres, and may be seasonably separated: But, to facilitate this and the like attempts, it is advisable to apply a ligature above the place when the sap is ascending, or beneath it when it (as they say vulgarly) descends. From June to November you may lay them; the scrubs and less erect do excellently to thicken copses, and will yield lusty shoots and useful fire-wood.

2. The Lime-tree affects a rich feeding loamy soil; in such ground its growth will be most incredible for speed and spreading. It may be planted as big as one's leg, and its head topped at about six or eight feet bole; thus it will become, of all other, the most proper and beautiful for walks,

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to dig between the rows every winter, and constantly to keep the ground free from weeds. The Lime-tree will grow well on almost any sort of soil or situation; but if planted in a rich and loamy earth, wherein, like most other trees, it chiefly delights, the growth of it will be almost incredible. This should be a great motive to the planting of this tree; which will, in a very few years, sufficiently reward the industrious planter.

2. *TILIA (Americana) floribus nectario instructis.* Kalm. *The American Lime-tree.* Of this species there are a few varieties, which indeed differ very little in appearance from those of our common European sorts, the leaves of both being heart-shaped.—There is a larger, and a smaller leaved sort. Their edges are finely serrated, and end in acute points. These beautifully cordated leaves, that thus run into acute points, have their under surface of a paler green than their upper. The larger-leaved kind is by far the finest sort; and the branches vary from all others of this genus, in that they are covered with a dark-brown bark. The flowers excite no attention in the Gardener; but the Botanist is delighted when he finds they are furnished with nectaria; whereas the flowers of our common Lime-tree have none. The flowers are produced in bunches, like our common sort, but make no better figure. They are very fragrant, and are succeeded by coriaceous capsules, containing the seeds.—The American sorts, as well as our own, should be raised from seeds; but when we have not the convenience of procuring the seeds from abroad, a few plants must be obtained. These should be planted in a light rich soil, if such can be had, for there they will shoot the strongest; though almost any other will do. After these plants have stood a year or two, they should be headed near the ground, for stools. They will then shoot out many young branches, which may be layered in the autumn; though if they stand two years there will be greater plenty of young twigs for layering; for every shoot of the first summer will the year following divide into several. When the layering of these is to be performed, which ought to be in the autumn, the strong two-years shoots must be brought down; and if they are stiff and do not bend

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as producing an upright body, smooth and even bark, ample leaf, sweet blossom, the delight of bees, and a goodly shade at the distance of eighteen or twenty-five feet. It is also very patient of pruning; but if it taper over much, some of the collateral boughs should be cut off to check the sap, which is best to be done about Midsummer; and to make it grow upright, take off the prepondering branches with discretion, and so you may correct any other tree, and redress its obliquity. The root, in transplanting, should not be lopped; and this, says Mr. Cook, is a good lesson for all young-planted trees.

3: The Prince Elector did lately remove very great Lime-trees out of one of his forests at Heidelberg, to a steep hill, exceedingly exposed to the

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readily, they must have a gentle splash with the knife near the bottom; a slit should be made at the joint for every one of the youngest twigs, and their ends bent backwards that the slit may be kept open. This being done, the mould must be levelled among the layers, and the ends of them taken off to within one eye of the ground. The business is then done; and the autumn following they will have all good roots, many of which will be strong, and fit to plant out for good, whilst the weakest may be removed into the nursery-ground, in rows, to gain strength. All the sorts of Lime-trees will also grow from cuttings; but this I have ever found to be an uncertain method; and if it were more certain, still plants raised either by them or layers are not near so good as those from seeds, which way ought always to be practised where they can be obtained.

The Lime-tree is of the class and order *Polyandria Monogynia*, there being in every flower numerous stamina and one style only.

The flowers begin to open about the fifteenth of May, and are in full blow by the thirteenth of July, when they appear of a white colour, and have a very fragrant smell. The leaves begin to open about the twelfth of April, are quite out by the eighteenth of the same month, and fall off very early in the autumn.

The timber of the Lime-tree is used by the carvers, it being a soft light wood, as also by architects for framing the models of their buildings; the turners likewise use it for making light bowls, dishes, &c. but it is too soft for any strong purposes.

These trees will continue growing, and remain sound a great number of years, and, if planted in a good loamy soil, will grow to a considerable bulk. Mr. Miller measured a Lime which was near ten yards in girth two feet about the ground, and was then in a very thriving condition; and Sir Thomas Brown mentions one of these trees which grew in Norfolk, that was sixteen yards in circuit a foot and a half above the ground, was thirty yards in height, and in the least part of the trunk eight yards and a half.

heat of the sun, and that in the midst of summer: They grow behind that strong tower on the south-west and most torrid part of the eminence, being a dry, reddish, barren earth, yet do they prosper rarely well: But the heads were cut off, and the pits into which they were transplanted were (by the industry and direction of Monsieur De Son, a Frenchman, and an admirable mechanician, who himself related it to me) filled with a composition of earth and cow-dung, which was exceedingly beaten, and so diluted with water, as it became almost a liquid pap: It was into this that he plunged the roots, covering the surface with the turf: A singular example of removing so great trees at such a season, and therefore taken notice of here expressly. Other perfections of the tree, besides its unparalleled beauty for walks, are, that it will grow in almost all grounds; that it lasts long; that it soon heals its scars; that it affects uprightness; that it stoutly resists a storm; that it seldom becomes hollow.

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4. The timber of a well-grown Lime is convenient for any use that the willow is; but much to be preferred, as being stronger and yet lighter; whence Virgil calls them *Tiliae leves* and therefore fit for yokes*. They are turned into boxes for the apothecaries.—Columella commends *Arculas Tiliaceas*. And because of its colour and easy working, and that it is not subject to split, architects make with it models for their designed buildings; and the carvers in wood use it not only for small figures, but large statues and entire histories in bas and high-relieve; witness, besides several more, the lapidation of St. Stephen, with the structures and elevations about it; the trophies, festoons, fruitages, encarpia, and other sculptures in the frontons, friezes, capitals, pedestals, and other ornaments and decorations, of admirable invention and performance, to be seen about the choir of St. Paul's and other churches, royal palaces, and noble houses in city and country, all of them the works and invention of our Lyfippus, Mr. Gibbons, comparable, and, for ought appears, equal to any thing of the antients. Having had the honour (for so I account it) to be the first who recommended this great artist to his Majesty Charles II. I mention it on this occasion with much satisfaction. With the twigs they make baskets and cradles, and of the smother side of the bark, tablets for writing; for the antient Philyra is but our Tilia, of which Munting affirms he saw a book made of the inward bark, written about a

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—— * et tilia ante jugo levis ———

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thousand years since. Such another was brought to the Count of St. Amant, Governor of Arras, 1662, for which there were given eight thousand ducats by the Emperor; it contained a work of Cicero, *De ordinanda Republica, & de inveniendis orationum exordiis*; — a piece inestimable, but never published, and now in the library at Vienna, after it had formerly been the greatest rarity in that of the late Cardinal Mazarine. Other papyraceous trees are mentioned by West-Indian travellers, especially in Hispaniola, Java, &c. whose inward bark not only exceeds our largest paper for breadth and length, and may be written on on both sides, but is comparable to our best vellum. Bellonius says, That the Grecians made bottles of the Tilia, which they finely rosined within-side. It makes pumps for ships, also lattices for windows: Shoemakers use dresters of the plank to cut leather on, as not so hard as to turn the edges of their knives; and even the coarsest membrane, or slivers of the tree growing betwixt the bark and the main body, they now twist into bafs-ropes; besides, the truncheons make a far better coal for gun-powder than that of Alder itself: Scribbles for painters first draughts are also made of its coals; and the extraordinary candor and lightness has dignified it above all the woods of our forest, in the hands of the Right Honourable the White-staff Officers of his Majesty's Imperial Court. The royal plantations of these trees in the parks of Hampton-Court and St. James's will sufficiently instruct any man how these (and indeed all other trees which stand single) are to be governed and defended from the injuries of beasts, and sometimes more *unreasonable* creatures, till they are able to protect themselves. In Holland, where the very highways are adorned with them, they frequently clap three or four deal-boards, in manner of a close trunk, about them, but it is not so well; because it keeps out the air, which should have free access and intercourse to the bole, and by no means be excluded from flowing freely about them, or indeed any other trees, provided they are secured from cattle, and the violence of impetuous winds, &c. as his Majesty's are, without those close coffins in which the Dutchmen seem rather to bury them alive: In the mean time, is there a more ravishing or delightful object, than to behold some entire streets and whole towns planted with these trees, in even lines before their doors, so as they seem like cities in a wood? This is extremely fresh, of admirable effect against the epilepsy, for which the delicately-scented blossoms are held prevalent, and screen the

houfes both from winds, fun, and duft; than which there can be nothing CH. XIV.
more defirable where ftreets are much frequented: For thus

Stat Philyra; haud omnes formofior altera furgit
Inter Hamadryades; molliffima, candida, lævis,
Et viridante comâ & beneolenti flore fuperba,
Spargit odoratam latè, atque æqualiter umbram.

COULEN lib. vi. PL

The ftately Lime, fmooth, gentle, ftraight, and fair,
(With which no other Dryad may compare)
With verdant locks, and fragrant bloffoms deckt,
Does a large, even, odorate fhade project.

Diræ and curfes therefore on thofe inhuman and ambitious tyrants, who, not contented with their own dominions, invade their peaceful neighbour, and fend their legions, without diftinction, to deftroy and level to the ground fuch venerable and goodly plantations, and noble avenues. Irreparable marks of their barbarity!

The diftance for walks, as we faid, may, in rich ground, be twenty-five feet; in more ordinary foil, eighteen or twenty. For a moft prodigious tree of this kind, fee book iii. chap. iii.

The berries, reduced to powder, cure the dyfentery, and ftop bleeding at the nofe. The diftilled water is good againft the epilepsy, apoplexy, vertigo, trembling of the heart, and gravel. Schroder commends a mucilage of the bark for wounds, *repellens urinam, & menfes ciens, &c.* And I am told the juice of the leaves fixes colours.

C H A P. XV.

The POPLAR, ASPEN, and ABELE *.

Book 1. 1. **P**OPULUS, the Poplar. I begin this second class, according to our former distribution, with the Poplar, of which there are several kinds, White, Black, &c. (which in Candy it is reported bears seed) besides the Aspen. The White (famous heretofore for yielding its umbram hospitalem) is the most ordinary with us, to be raised in abundance by every fet or slip. Fence the ground as far as any old Poplar roots extend, and they will furnish you with suckers innumerable, to be slipped from their mothers, and transplanted the very first year; but if you cut down an old tree, you shall need no other nursery. When they are young, their leaves are somewhat broader and rounder, as most other trees are, than when they grow aged. In moist and boggy places they will flourish wonderfully, so the ground be not spewing; but especially near the margins and banks of rivers [*Populus in fluviis*—] and in low, sweet, and fertile grounds, yea, and in the drier likewise. Truncheons of seven or eight feet long,

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* The Poplar is the most valuable of all the aquatics, whether we consider the quickness of its growth, or the magnitude to which it will arrive: And although this tree is stiled an Aquatic, yet it will grow exceeding well, and attain an extraordinary bulk in a few years, on ground tolerably dry.

There are many species of the Poplar, though I shall recommend only three to be planted for timber-trees. These are, the White Poplar, known by the name of the Abele-tree; the Black Poplar, so called from a black circle perceived at the centre of its trunk when felled; and the Trembling Poplar, or Aspen-tree.

1. **POPULUS** (*Alba*) foliis subrotundis, dentato-angulatis subtus tomentosis. Hort. Cliff. 460. *Poplar-tree with roundish angular leaves, which are downy on their under side.* *Populus alba majoribus foliis.* C. B. P. 429. *White Poplar with larger leaves, commonly called the Abele-tree.*

2. **POPULUS** (*Nigra*) foliis deltoidibus acuminatis serratis. Hort. Cliff. 460. *Poplar with pointed sawed leaves, shaped like the Delta.* *Populus nigra.* C. B. P. 429. *Black Poplar.*

3. **POPULUS** (*Tremula*) foliis subrotundis, dentato-angulatis utrinque glabris. Hort. Cliff. 460. *Poplar-tree with roundish leaves, which are angularly indented, and smooth on both sides.* *Populus tremula.* C. B. P. 429.

The flowers of this tree are male and female, on distinct plants, and the male flowers have eight stamina, which shews it to belong to the class and order *Diœcia* *Ostœndria*. The male and female flowers are both arranged into an amentum. In the



The White Poplar Tree.

Published Jan^y 1st 1776. by A. Hunter M.D. as the Act directs.

J. Miller del. & Sc.

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thrust two feet into the earth, (a hole being made with a sharp hard stake, filled with water, and then with fine earth pressed in, and close about them) when once rooted, may be cut at six inches above ground; and thus placed at a yard distant, they will immediately furnish a kind of copse: But in case you plant them of rooted trees, or smaller sets, fix them not so deep; for though we bury the truncheons thus profound, yet is the root which they strike commonly but shallow. They will make prodigious shoots in fifteen or sixteen years; but then the heads must by no means be diminished, but the lower branches may, yet not too far up; the foot should also be cleaned every second year: This for the White. The Black Poplar is frequently pollared, when as big as one's arm, eight or nine feet from the ground, as they trim them in Italy for their Vines to serpent and twist on, and those they poll, or head, every second year, sparing

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beginning of April they make their appearance; though the Aspen flowers will be full blown by the twenty-second of March. The male flowers appear first, and the female about a week after. The catkins are about three inches long. Soon after the female flowers come out, the males drop off the tree; and in about five or six weeks the female will have ripe seeds, which are sometimes dispersed by the winds to a considerable distance.

The trunk of the White Poplar is straight, and covered with a smooth whitish bark. The leaves are about three inches long, and stand upon foot-stalks about an inch in length: they are indented at the edges; are of a dark green on the upper surface, but white and woolly underneath. They are usually quite out by the eighteenth of April.

The leaves of the Black Poplar are not so large as the former; their colour is a pleasant green; they are heart-shaped, and appear about the twenty-second of April.

The leaves of the Aspen are smaller than those of the Black Poplar. They stand upon long slender foot-stalks, which renders it, of all the other sorts, the most tremulous; are roundish, and smooth on both sides; but do not make their appearance before the beginning of May.

The propagation of the Poplar-tree is very easy. It will grow from cuttings, suckers, and truncheons; tho' I by no means approve of the planting of truncheons, as often practised on boggy places; because I have always observed, that plantations of these luxuriant trees, attempted to be raised in this manner, have been frequently stocked; and that the most promising trees have never equalled, in goodness or beauty, such as had been raised in the nursery.

In order, therefore, to obtain a quantity of Poplars, proper to be planted in avenues or clumps, by the sides of rivulets, bogs, or any other places where they are desired, you must get a piece of ground double dug for the nursery. If the trees wanted are to be planted for good in a watery situation, this nursery-ground should be pretty near it;

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the middle, straight, and thrivingest shoot, and at the third year cut him also. There be yet that condemn the pruning of this Poplar, as hindering its growth.

2. The shade of this tree is esteemed very wholesome in summer, but they do not become walks or avenues, by reason of their suckers, and that they foul the ground at the fall of the leaf; but they should be planted in barren woods, and to flank places at distance for their increase, and the glittering brightness of their foliage: The leaves are good for cattle, which must be stripped from the cut boughs before they are faggotted.

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but if they are designed for pasture-grounds, fields, or such as have no more than a common degree of moisture, the soil of the nursery should be proportionably drier.

Spring is the best season for planting the cuttings; though they will grow if planted in any of the winter months. They should all be vigorous shoots of the last year, or at least not older than two years. These cuttings should be one foot and a half in length; and must be planted in the nursery-ground in rows, a yard asunder, and at a foot and a half distance from one another. They should be planted a foot in the ground, and the other part should remain above to send forth the leading-shoot. Now, in order to have one leading-shoot only, the plants should be carefully looked over in summer, and all young side-branches nipped off, in order to encourage the leading branch. After this, no farther care need be taken of them than keeping them clean of weeds, and digging between the rows in the winter, till they have attained a proper size to plant out for good, which will be in two years, if they are designed to form small woods, or spinneys, in boggy or watery grounds.

If they are wanted for standards, for fields, sides of rivers, &c. they may remain in the nursery another year, when they will not be too large for that purpose, but may be taken out and planted; and in a few years they will make a surprizing progress, so as to be worth, in about twenty or thirty years, as many shillings, or more, a-piece.

In order to form a coppice of these trees, if the land be not so boggy but that it may be plowed, a crop of oats or other grain may be got off it the preceding year of planting; and in the autumn it would be a still greater advantage, if, just before the planting, it was to be plowed again; as by this operation it would be rendered lighter, and the weeds, &c. would be buried. Having prepared the ground, let the two-year old plants be taken out of the nursery, and planted one yard asunder. It will be proper to continue hoeing the weeds down for the first year: Afterward, they will require no farther trouble till the time of cutting, which may be done in seven years from the first planting; and every four or five years after they may be cut for poles, fire-wood, &c. The quickness of the growth of these trees, and their value when cut, even for these purposes, greatly augment the value of the land planted with them: Nay, by this means boggy or marshy ground will produce more per acre than the best pasture or feeding land; a consideration which should stimulate every Gentleman possessed of a large quantity of such sort of land, which brings him in very little, to im-

This to be done in the decrease of October, and reserved in bundles for winter fodder. The wood of the White Poplar is sought of the sculptor, and they saw both sorts into boards, which, where they lie dry, continue a long time. Of this material they also made shields of defence in sword and buckler days. Dioscorides writes, that the bark chopped small, and sowed in rills, well and richly manured and watered, will produce a plentiful crop of Mushrooms; or warm water, in which yeast is dissolved, cast upon a new-cut stump. It is to be noted that those fungi, which spring from the putrid stumps of this tree, are not venomous, (as of all or most other trees they are) being gathered after the first autumnal rains. There is a Poplar of a paler green, and is the properest for watery ground; it will grow of truncheons from two to eight feet

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prove it in this manner; and the improvement will be the greater, in proportion as the scarcity of wood in his neighbourhood is greater or less. If the ground for these plantations be so boggy as not to admit of plowing and sowing, then the planter must be contented with taking the plants out of the nursery, and setting them in holes at the aforesaid distance; and they will thrive surprisingly even in this way.

Every Gentleman desirous of having plantations of large trees of the sorts I have recommended, should plant them as before directed, at one yard asunder; and when their heads begin to interfere and incommode one another, every other tree should be taken away, which will sell for large poles; and the remainder should be left to grow for timber. But though I advise every other tree to be taken away, I would not have this caution too strictly observed: I only mean to have the weakest and least thriving eradicated; and if two fine luxuriant trees stand together, and others less promising on each side, let the weakest be taken up. And thus they should continue to be thinned as often as they grow too close, till you have a plantation of timber Poplar-trees.

I must not forget to give another precaution to the Poplar planter, viz. That after these trees are planted out for good, he should never suffer a tree to be stripped up, nor even a side-branch taken off; for by doing this, the progress of the tree will be stopped for some years; whereas, if these are permitted to remain, they will powerfully attract the nutritious juices, and help to supply the trunk, as well as themselves, in such plenty, as to contribute surprisingly to the increase of the tree.

4. *POPULUS (Balsamifera) foliis subcordatis denticulatis.* Hort. Cliff. 460. *The Carolina Poplar.*

This Poplar grows to a large timber-tree, and has a peculiar majesty. It is an exceeding swift grower, inasmuch that I have known it shoot ten feet in the space of one summer, and to grow in thickness, nearest the base, an inch in diameter. The bark is smooth, and of a whitish colour; though that on the young shoots

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long, and bringing a good lop in a short time, is by some preferred to Willows.

For the setting of these Mr. Cook advises the boring of the ground with a sort of auger, to prevent the stripping of the bark from the stake in planting. A foot and half deep, or more if great, (for some may be eight or nine feet) for Pollards, cut sloping, and free of cracks at either end. Two or three inches diameter is a competent bigness, and the earth should be rammed close to them.

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is of a fine green. The young shoots are cornered, having five angles; and the bark of which these are composed, being extended by the future growth, leaves only the traces of these angles on the older branches; and this again gives the tree in winter a particular look; for at the base of each bud they curve over and meet. Thus there will be between every bud formed by the bark, figures like niches, as it were, of public buildings, though with an upright in the middle, at the top of each of which, like an ornament, is seated the bud, for the future shoot or leaf. These buds are only to be found on the younger branches; but the figure is retained on the bark of the older without those ornaments. But of all the trees in a collection, no one more agreeably entertain us by its leaves than this, whether we consider the colour, figure, or size. The colour is a light shining green, which is heightened in the autumn, by the strong mid-rib, and the large veins that issue from it, turning to a red; the lesser veins also being in some degree affected, occasion upon the same leaf a sweet contrast. Their figure nearly resembles that of an heart, and they are notched at the edges. But the chief majesty this tree receives is from the size of the leaves: I have measured some of the younger trees, and found the leaves ten inches long and eight broad, with a strong-foot-stalk of four inches in length. These majestic leaves are placed alternately on the branches; though, as the tree advances in height, they diminish in size. This species shoots late in the autumn; and these young shoots have their ends often killed in hard winters; which is an imperfection, as it causes the tree to have a very bad look in the spring, both before and when the leaves are putting out: However, these last will not fail afterwards to make ample amends for the former defect. The flowers afford no pleasure to the Gardener; they are catkins, like other Poplars, and fit only for the inspection of the curious Botanist.

5. *POPULUS (Heterophylla) foliis cordatis primoribus villosis.* Lin. Sp. Pl. 1464.
The Virginia Poplar.

This species of Poplar also forms a large timber-tree. The branches are numerous, veined, and angular. The leaves are heart-shaped, broad, slightly serrated, and downy on their first appearance. The flowers come out in loose catkins, and

Another expedient is by making drains in very moist ground, two spade deep and three feet wide, casting up the earth between the drains, sowing it the first year with oats to mellow the ground; the next winter setting it for copse, with these, any, or all the watery sorts of trees; thus, in four or five years, you will have a handsome fell; and so successively. It is in the former author, where the charge is exactly calculated, to whom I refer the reader. I am informed that in Cheshire there grow many stately and straight Black Poplars, which they call *Peplurus*, that yield boards and planks of an inch and half thickness; so fit for flooring of rooms, as by some preferred to Oak, for the whiteness and lasting, where they lie dry.

3. They have a Poplar in Virginia of a very peculiar shaped leaf, as if the point of it were cut off, which grows very well with the curious amongst

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make little show; they appear early in the spring, and are succeeded by numerous downy seeds, which are dispersed all about to a considerable distance.

The Lombardy Poplar is another species of this tree; but we have none of them in this kingdom of sufficient age to enable us to fix the standard of its excellence. So far as we yet know, it promises to answer the high character given of its quick growth.

The Poplar was sacred to Hercules. "*Populus Alcideæ gratissima*," and when any ceremonies were instituted in honour of that God, its tender branches and leaves were twined round the heads of the Votaries.

Tum Salii ad cantus, incensa altaria circum,

Populeis adsunt evincti tempora ramis.

ÆN. viii.—285

It was customary with lovers to write verses upon the bark of different trees.——
Ovid, in the epistle from Oenone to Paris, fixes upon the Poplar.

Populus est, memini, fluviali confita ripa,

Est in qua nostri litera scripta memor.

Popule, vive, precor, quæ confita margine ripæ

Hoc in rugoso cortice carmen habes:

Cum Paris Oenone poterit spirare relicta

Ad fontem Xanthi versa recurret aqua.

Homer beautifully compares the fall of Simoisius, by the hand of Ajax, to a Poplar just cut down.

So falls a Poplar, that in wattr'y ground

Rais'd high the head, with stately branches crown'd,

(Fell'd by some artist with his shining steel,

To shape the circle of the bending wheel)

Cut down it lies, tall, smooth, and largely spread,

With all its beauteous honours on its head.

POPE.

Book I. us to a considerable stature. I conceive it was first brought over by John Tradescant, under the name of the Tulip-tree, (from the likeness of its flower) but is not, that I find, taken much notice of in any of our herbals. I wish we had more of them, but they are difficult to elevate at first*.

4. The Aspen only (which is that kind of Lybica, or White Poplar, bearing a smaller and more tremulous leaf, by the French called *La Tremble*, or *Quaker*) thrusts down a more searching foot, and in this likewise differs, that he takes it ill to have his head cut off. Pliny would have short truncheons couched two feet in the ground, but first two days dried, at one foot and half distance, and then moulded over.

5. There is something a finer sort of White Poplar, which the Dutch call *Abele*, and we have of late much of it transported out of Holland. These are also best propagated of slips from the roots, the least of which

N O T E S.

* This tree is called by Linnæus *Liriodendron* (*Tulipifera*) *foliis lobatis*. Herman calls it *Tulipifera arbor Virginiana*; and Plukenet and Catesby, *Tulipifera Virginiana, tripartito acris folio; media lacinia velut abscissa*; also *Tulipifera Caroliniana, foliis productioribus magis angulosis*. It is of the class and order *Polyandria Polygynia*.

The Tulip-tree is a native of North-America: It is a tree of the first magnitude, and is generally known through all the English settlements by the title of Poplar. Of late years there have been great numbers of these trees raised from seeds in the English gardens, so that now they are become common in the nurseries about London; and there are many of them in several parts of England which do annually produce flowers. The first tree of this kind which flowered here, was in the gardens of the late Earl of Peterborough, at Parsons Green near Fulham, which was planted in a wilderness among other trees; before this was planted in the open air, the few plants which were then in the English gardens, were planted in pots and housed in winter, supposing they were too tender to live in the open air; but this tree, soon after it was placed in the full ground, convinced the gardeners of their mistake, by the great progress made, while those which were kept in pots and tubs increased slowly in their growth; so that afterward there were many others planted in the full ground, which are now arrived to a large size, especially those which were planted in a moist soil. One of the handsomest trees of this kind, near London, is in the garden of Waltham Abbey; and at Wilton, the seat of the Earl of Pembroke, there are some trees of great bulk; but the old tree at Parsons Green is quite destroyed by the other trees which were suffered to over-hang it, and rob it of its nourishment, from the fear of taking them down, lest, by admitting the cold air, the Tulip-tree might be injured.—The young shoots of this tree are covered

will take, and may in March, at three or four years growth, be transplanted.

6. In Flanders (not in France, as a late author pretends) they have large nurseries of them, which first they plant at one foot distance, the mould light and moist, by no means clayey, in which though they may shoot up tall, yet for want of root they never spread; for, as I said, they must be interred pretty deep, not above three inches above ground, and kept clean by pruning them to the middle shoot for the first two years, and so till the third or fourth. When you transplant, place them at eight, ten, or twelve feet interval. They will likewise grow of layers, and even of cuttings in very moist places. In three years they will come to an incredible altitude; in twelve be as big as your middle, and in eighteen or twenty arrive to full perfection. A specimen of this advance we have had of an Abele tree at Sion, which being lopped in February 1651, did, by the end of October 1652, produce branches as big as a man's wrist, and seventeen

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with a smooth purplish bark; they are garnished with large leaves, whose foot-stalks are four inches long; they are ranged alternate; the leaves are of a singular form, being divided into three lobes; the middle lobe is blunt and hollowed at the point, appearing as if it had been cut with scissars. The two side-lobes are rounded, and end in blunt points. The leaves are from four to five inches broad near their base, and about four inches long from the foot-stalk to the point, having a strong mid-rib, which is formed by the prolongation of the foot-stalk. From the mid-rib run many transverse veins to the borders, which ramify into several smaller. The upper surface of the leaves is smooth, and of a lucid green, the under is of a pale green. The flowers are produced at the end of the branches; they are composed of six petals, three without, and three within, which form a sort of bell-shaped flower, from whence the inhabitants of North-America give it the title of Tulip. These petals are marked with green, yellow, and red spots, so make a fine appearance when the trees are well charged with flowers. The time of this tree's flowering is in July, and when the flowers drop, the germen swells and forms a kind of cone, but these seldom ripen in England.—Mr. Catesby, in his Natural History of Carolina, says, "There are some of these trees in America which are thirty feet in circumference; the boughs are unequal and irregular, making several bends or elbows, which render the trees distinguishable at a great distance, even when they have no leaves upon them. They are found in moist parts of the northern continent of America, from the Cape of Florida to New-England, where the timber is of great use, the trunk being frequently hollowed, and made into boats big enough to carry a number of men."

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feet in length; for which celerity we may recommend them to such late builders as seat their houses in naked and unheltered places, and that would put a guise of antiquity upon any new inclosure; since by these, whilst a man is on a voyage of no long continuance, his house and lands may be so covered as to be hardly known at his return. But as they thus increase in bulk, their value, as the Italian Poplar has taught us, advances likewise; which, after the first seven years, is annually worth twelve pence more: So as the Dutch look upon a plantation of these trees as an ample portion for a daughter, and none of the least effects of their good husbandry; which truly may very well be allowed, if that calculation hold, which the late worthy Knight * has asserted, who began his plantation not long since about Richmond, that thirty pounds being laid out in these plants, would render at least ten thousand pounds in eighteen years; every tree affording thirty plants, and every of them thirty more, after each seven years improving twelve pence in growth till they arrive to their *acme*.

* Sir Richard
Weston.

7. The Black Poplar grows rarely with us; it is a stronger and taller tree than the White, the leaves more dark, and not so ample. Divers stately ones of these, I remember about the banks of the Po in Italy; which flourishing near the old Eridanus (so celebrated by the Poets) in which the temerarious Phaeton is said to have been precipitated, doubtless gave argument to that fiction of the metamorphosis of his sad sisters, and the amber of their precious tears *. It was whilst I was passing down that river

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* It does not appear from Ovid that the Sisters of Phaeton were changed into *Poplars*. The supposition probably arose from observing the banks of the Eridanus, or Po, covered with these trees.—Others again say that they were changed into *Larches*, and this supposition seems as probable as the other; for Vitruvius remarks, “*Larix vero, non est notus nisi his municipibus, qui circa ripam fluminis Padi et littora maris Adriatici.*” In a medal of *Publius Accoleius Lariscolus*, the three Sisters (*Heliades*) are represented as transformed into *Larches*, and Montfaucon quotes *Palladius* as saying, “*Resina illa liquida est, lacrymæ similis; non recipit flammam, quasi odio persequatur, ob combustum Phaëthontidem.*” This sentence, however, is not to be found in *Palladius*. He only says, speaking of *Larches*, “*Neque enim flammam recipiunt, aut carbonem creare possunt.*” *Lib. xii. tit. xv.* It would seem that Ovid himself meant the *Larch-tree*, from his description of the tears of the sorrowful Sisters.

Inde fluunt lacrymæ: stillataque sole rigescunt
De ramis electra novis: quæ lucidus amnis
Excipit, et nuribus mittit gestanda Latinis.

MET. lib. ii.

towards Ferrara, that I diverted myself with this story of the ingenious Poet. I am told there is a Mountain Poplar much propagated in Germany about Vienna, and in Bohemia, of which some trees have yielded planks of a yard in breadth: Why do we procure none of them?

8. The best use of the Poplar and Abele (which are all of them hospitable trees, for any thing thrives under their shade) is for walks and avenues about grounds which are situated low, and near the water, till coming to be very old, they are apt to grow knurly, and out of proportion. The timber is incomparable for all sorts of white wooden vessels, as trays, bowls, and other turner's ware; and of especial use for the bellows-maker, because it is almost of the nature of cork, and for ship-pumps, though not very solid, yet very close, and yet light, so as it may be used for the soles, as well as wooden heels, of shoes. *Vitruvius l. de materie cedenda*, reckons it among the building-timbers, *que maximè in edificiis sunt idoneæ*. It is proper for carts, because it is exceeding light; also for Vine and Hop-props, and divers vimineous works. The loppings in January are for the fire; and therefore such as have proper grounds may, with ease, and in a short time, store themselves for a considerable family, where fuel is dear: But the truth is, it burns untowardly, and rather moulders away than maintains any solid heat. Of the twigs, with the leaves on, are made brooms. The brya, or catkins, attract the bees; as do also the leaves, especially of the black, being more tenacious of the mildews than most forest-trees, the Oak excepted.

Of the Aspen, our woodmen make hoops, fire-wood, coals, &c. and the bark of young trees, in some countries, serves for candle or torch-wood.

The juice of Poplar leaves, dropped into the ears, assuages the pain; and the buds contused, and mixed with honey, is a good collyrium for the eyes, as the unguent to refrigerate and cause sleep.

One thing more is not to be passed over, of the White Poplar; that the seeds of Mistleto being put into holes bored in the bark of this tree, have produced the plant.—An experiment sufficient to determine that so long controverted question concerning spontaneous and equivocal generation. Vide D. Raii H. P. Append. p. 1918.

CHAP. XVI.

The QUICK-BEAM *

BOOK I.

1. **T**HE QUICK-BEAM, *Ornus*, or, as the *Pinax* more peculiarly terms it, *Fraxinus Bubula*, others the Wild *Sorb* and *Witcher*, is a species of Wild *Ash*. The berries which it produces in October may then be sown, or rather the sets planted. I have store of them in a warm grove of mine, and it is of singular beauty. It rises to a reasonable stature, shoots upright and slender, and consists of a fine smooth bark. It delights to be both in mountains and woods, and to fix itself in good light grounds. Virgil affirms it will unite with the Pear.

2. Besides the use of it for the husbandman's tools, goads, &c. the wheel-wright commends it for being all heart; if the tree be large, and so well grown as some there are, it will saw into planks, boards, and timber; our fletchers commend it for bows next to *Yew*, which we ought

N O T E S.

* This is the *SORBUS* (*Aucuparia*) foliis pinnatis, utrinque glabris. Hall. Helv. 250. *Service-tree* with winged leaves which are smooth on both sides. *Sorbus sylvestris*, foliis domesticæ similis. C. B. P. 415. *Wild Service* with leaves like the cultivated, commonly called *Quicken*, *Quick-beam*, *Mountain Ash*, and in the north, *Roan-tree*.

The *Quick-beam* grows naturally in many parts of England; but in the southern counties it is seldom seen of any great magnitude, being commonly cut down, and reduced to underwood; but in the North of England and Wales, where the trees are permitted to grow, they arrive at a considerable size. The stems are covered with a smooth gray bark, the branches while young have a purplish brown bark, and the leaves are winged; they are composed of eight or nine pair of long narrow lobes, terminated by an odd one; the lobes are about two inches long, and half an inch broad toward their base, ending in acute points, and are sharply sawed on their edges; the leaves on the young trees in the spring are hoary on their under side, which about Midsummer goes off, and those upon the older branches have very little at any season. The flowers are produced in large bunches almost in form of umbels, at the end of the branches; they are composed of five spreading concave petals shaped like those of the Pear-tree, but smaller; these are succeeded by roundish berries, growing in large bunches, which have a depressed navel on the top, and turn red in autumn when they ripen.

The buds of this tree begin to open about the beginning of April. The leaves are out by the middle of the month, and the flowers are in full blow by the sixth of



The Quicken Tree.

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J. Miller del. & Sc.

not to pass over, for the glory of our once English ancestors: In a statute of Henry VIII. you have it mentioned. It is excellent fuel; but I have not yet observed any other use, save that the blossoms are of an agreeable scent, and the berries such a tempting bait for the Thrushes, that as long as they last, you shall be sure of their company. Some highly commend the juice of the berries, which, fermenting of itself, if well preserved, makes an excellent drink against the spleen and scurvy: Ale and beer brewed with these berries, being ripe, is an incomparable drink, familiar in Wales, where this tree is reputed so sacred, that there is not a church-yard without one of them planted in it (as among us the Yew); so, on a certain day in the year, every body religiously wears a cross made of the wood; and the tree is by some authors called *Fraxinus Cambro-Britannica*, reputed to be a preservative against fascinations and evil spirits; whence, perhaps, we call it Witchin, the boughs being stuck about the house, or the wood used for walking-staves.

NOTES.

May. There are three styles and twenty stamina inserted into the Calyx, which shews it to belong to the class and order *Icosandria Trigynia*.

The Quick-beam is raised from seeds sown as soon as ripe, in beds properly prepared. These frequently remain till the second spring before they make their appearance; and in the spring following they should be put out into the nursery. It is sometimes raised from layers; but when cultivated in that manner, the trees are neither so handsome nor so straight as those raised from seeds.

This tree will grow upon almost any soil, either strong or light, moist or dry. It will flourish on mountains and in woods, and is never affected by the severity of weather, being extremely hardy. When loaded with fruit, it makes a most delightful appearance.

Sanguineisque inculca rubent aviaria baccis. VIRG.

C H A P. XVII.

The H A S E L *

BOOK I.

NUX SILVESTRIS, or Corylus, the Hasel, is best raised from the nuts, also by suckers and layers, which you shall sow like mast, in a pretty deep furrow, toward the end of February, or treat them as you are instructed in the Walnut. Light ground may immediately be sown and harrowed in very accurately; but in case the mould be clay, plow it earlier, and let it be sufficiently mellowed with the frosts; and then the third year cut your trees near to the ground with a sharp bill, the moon decreasing.

2. But if you would make a grove for pleasure, plant them in fosses, at a yard distance, and cut them within half a foot of the earth, dressing them for three or four springs and autumns, by only loosening the mould a little about their roots. Others there are who set the nuts by hand at one foot distance, to be transplanted the third year, at a yard asunder: But this work is not to be taken in hand so soon as the nuts fall, till winter.

N O T E S.

* There are only two species of this genus.

1. *CORYLUS (Avellana) stipulis ovatis obtusis.* Hort. Cliff. 448. *Hasel Nut with oval blunt stipule.* *Corylus Sylvestris.* C. B. P. 418. *Wild Hasel Nut.*

2. *CORYLUS (Colurna) stipulis linearibus acutis.* Hort. Cliff. 448. *Hasel Nut with narrow acute stipule.* *Corylus Byzantina.* H. L. 191. *Byzantine Nut.*

The Corylus, in the Linnæan System, is of the class and order *Monoecia Polyandria*.

The flowers begin to open about the twenty-fifth of January, and in a month's time are in full blow. They are small and of a beautiful red colour. The catkins make their appearance about the middle of September.

The common Hasel grows wild in almost every part of this island, and serves very well for thickening woods. When allowed to grow, it will make poles of twenty feet, but it is usually cut down sooner for walking-sticks, fishing-rods, withs for fagoting, &c. for which necessary purposes it is recommended as a profitable wood.

In order to raise a coppice of Hasels, the nuts must be gathered in the autumn. These must carefully be preserved till the month of February in a moist place to keep the nuts from growing dry: then, having the ground well plowed and harrowed, let them be



The Hazel Nut Tree

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J. Millor del. & sc.

be well advanced, because they are exceedingly obnoxious to the frosts; CH. XVII.
nor will they sprout till the spring; besides, vermin are great devourers of
them. Preserve them therefore moist, not mouldy, by laying them in
their own dry leaves, or in sand, till January.

Plantis eduræ Cōryli nascuntur ———— GEORG. iii.

Hafels from sets and suckers take.

3. From whence they thrive very well, the shoots being of the scant-
lings of small wands and switches, or somewhat bigger, and such as have
drawn divers hairy twigs, which are by no means to be disbranched, no
more than their roots, unless by a very sparing and discreet hand. Thus
your coryletum, or copse of Hafels, being planted about autumn, may,
as some practise it, be cut within three or four inches of the ground the
spring following, which the new cyon will suddenly repair in clusters, and
tufts of fair poles of twenty, or sometimes thirty feet long: But I rather
should spare them till two or three years after, when they shall have taken
strong hold, and may be cut close to the very earth, the improsperous and
feeble ones especially. Thus are Filberts likewise to be treated, both of

NUT-TREES.

sown in drills drawn at one yard distance; into these drop the nuts at about ten inches
distance, and let them be covered with two inches of earth. When the young plants
appear, they must be kept clear from weeds in the manner formerly ordered for trees
planted in rows, and they must remain under that careful cultivation till the weeds are
no longer to be feared. Where the plants stand too thick, they should be properly
thinned, and this thinning ought to be continued till the plants are left a yard asunder
each way. A Coryletum may also be raised from plants drawn from the seminary,
when they are a foot or two feet high. These should be planted where they are to re-
main at one yard asunder. In twelve years they may be cut down for poles; but they
will be ready for a second fall much sooner; and afterwards may be cut every seventh
or eighth year, when the stools will send up strong and vigorous shoots. The Byzantine
Nut is distinguished from the other species chiefly by the stipulæ which are very narrow
and acute, whereas these of the common Nut are oval and obtuse. It differs also in the
size of its growth, the Byzantine seldom growing higher than four or five feet, hence
it got the name of *Dwarf-nut-tree*. In other respects it is like our common Nut-tree;
it flowers at the same time, and the fruit is produced in clusters. Mr. Miller suspects
this and the Barcelona Nut to be the same.

The Filbert, or *Corylus sativa fructu oblongo*, is not a distinct species, but only a
variety of the Common Nut. This can only be kept true to its kind by suckers, or

BOOK I. them improved much by transplanting; but chiefly by grafting, and fit should be tried with Filberts, and even with Almonds themselves, for more elegant experiments.

In the mean time, I do not confound the Filbert, Pontic, or Filbord, distinguished by its beard, among our foresters or bald Hasel-nuts, which doubtless we had from abroad; and bearing the names of Avelan, Avelin, as I find in some antient records and deeds in my custody, where my ancestors names were written Avelan, alias Evelin, generally.

For the place, they above all affect cold, barren, dry, and sandy grounds; mountains, and even rocky soils produce them; they prosper where quarries of freestone lie underneath, as at Hasulberry in Wilts, Haselmingfield in Cambridgeshire, Haselmeer in Surry, and other places; but more plentifully, if the ground be somewhat moist, dankish, and mossy, as in the fresher bottoms and sides of hills, shoults, and in hedge-rows. Such as are maintained for copses, may after twelve years be felled the first time; the next at seven or eight; for by this period their roots will be completely vigorous. You may plant them from October to January, provided you keep them carefully weeded till they have taken fast hold; and there is not among all our store a more profitable wood for copses, and therefore good husbands should store them with it.

5. The use of the Hasel is for poles, spars, hoops, forks, angling-rods, fagots, cudgels, coals, and springes to catch birds; and it makes one of

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layers, which last are observed to make the best trees. In order to form stools some plants of the best kinds should be procured—and the twigs layered from them should be taken off and planted in the nursery, a foot asunder, and two feet distant in the rows. When well rooted they may be removed into the ground where they are to remain. In some parts of Kent plantations of Filberts are much attended to. The trees are never permitted to rise above five feet in height, and are regularly pruned and dished out like Gooseberry-bushes. They should stand at the distance of twelve feet, and when full spread the diameter of the cup formed by the branches should be about six feet. The intermediate spaces should be cultivated with beans, turnips, and hoeing crops, for upon the constant stirring of the ground the vigour of the trees principally depends. I am well informed that two bushels of nuts have been gathered from one tree managed in this manner. In a scarce year, Filberts in the husk are worth sixteen shillings per bushel—a great encouragement for plantations of this species. Hops

the best coals, once used for gunpowder, being very fine and light, till they found Alder to be more fit: There is no wood which purifies wine sooner than the chips of Hasel; also for withs and bands, upon which I remember, Pliny thinks it a pretty speculation, that a wood should be stronger to bind withal, being bruised and divided, than when whole and entire. The coals are used by painters to draw with, like those of Sallow: Lastly, for riding switches, and divinatory rods for the detecting and finding out of minerals; at least, if that tradition be no imposture. By whatsoever occult virtue the forked stick, so cut and skilfully held, becomes impregnated with those invisible steams and exhalations, as by its spontaneous bending from an horizontal posture, to discover not only mines and subterraneous treasure, and springs of water, but criminals guilty of murder, &c. made out so solemnly, by the attestation of magistrates, and divers other learned and credible persons, who have critically examined matters of fact, is certainly next to a miracle, and requires a strong faith. Let the curious therefore consult that philosophical treatise of Dr. Vallemont*, which will at least entertain them with a world of surprizing things. But now after all the most signal honour it was ever employed in, and which might deservedly exalt this humble and common plant above all the trees of the wood; is that of hurdles, especially the flexible white, the red, and brittle; not for that it is generally used for the folding of our innocent sheep, an emblem of the church, but for making the walls of one of the first Christian Oratories in the world; and particularly in this island, that venerable and sacred fabrick at Glastonbury founded by St. Joseph of Arimathea, which is storied to have been first composed but of a few small Hasel-rods interwoven about certain stakes driven into the ground;—and walls of this kind, instead of laths and punchions, superinduced with a coarse mortar made of loam and straw, do to this day inclose divers humble cottages, sheds, and out-houses in the country; and

* Vallemont, Philosophie Occult ou Traité de la Baguette Divinoire, &c. But concerning the exploration and superstitious original, see Sir Thomas Brown's Vulgar Errors, c. xxiv. sect. xvii. and the commentators upon Hosea iv. 12.

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are sometimes raised between the Filbert-trees, so that the expectations of the planter may be gratified with one, and sometimes two crops.

It is an observation of great antiquity, and well confirmed, that “a good nut year makes a good wheat year.”

Contemplator item, cum se nux plurima sylvis
Induet in florem, et ramos curvabit olentes:
Si superant fœtus, pariter frumenta sequuntur.
Magnaue cum magno veniet tritura calore.
At si luxuria foliorum exuberat umbra,
Nequicquam pingues palea teret area culmos.

VIRE.

Book I.

it is strong and lasting for such purposes, whole or cleft, and I have seen ample inclosures of courts and gardens so secured.

6. There is a compendious expedient for the thickening of copses which are too transparent, by laying of a sampler, or pole, of an Hasel, Ash, Poplar, &c. of twenty or thirty feet in length, the head a little lopped, into the ground, giving it a chop near the foot to make it succumb; this fastened to the earth with a hook or two, and covered with some fresh mould at a competent depth, (as gardeners lay their carnations) will produce a world of suckers, and thicken and furnish a copse speedily. I add no more of Filberts, a kinder and better sort of Hasel-nut, of larger and longer shape and beard; the kernels also covered with a fine membrane, of which the red is more delicate: they both are propagated as the Hasel, and while more domestick, planted either asunder or in palisade, are seldom found in the copses. They are brought among other fruit to the best tables for desert, and are said to fatten; but, when too much eaten, are obnoxious to the asthmatic. In the mean time, of this I have had experience, that Hasel-nuts, but the Filbert especially, being full ripe, and peeled in warm water, as they blanch Almonds, make a pudding very little, if at all, inferior to that our Ladies make of Almonds.



The Birch Tree.

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J. Miller del et sc.

C H A P. XVIII.

The BIRCH *.

1. **B**ETULA, the Birch, or Birc, (whence some derive the name of CH. XVIII.
 Berkshire) in British Bedw, is doubtless a proper indigene of England, tho' Pliny calls it a Gaulish tree. It is altogether produced of roots or suckers, (though it sheds a kind of samera about the spring) which being planted at four or five feet interval, in small twigs, will suddenly rise to trees, provided they affect the ground, which cannot well be too barren or spungy; for it will thrive both in the dry and the wet, sand and stony, marshes and bogs; the water-galls, and uliginous parts of forests that hardly bear any grass, do many times spontaneously produce it in abundance, whether the place be high or low, and nothing comes amiss to it. Plant the small twigs, or suckers having roots, and after the first year cut them within an inch of the surface; this will cause them to sprout in strong and lusty tufts, fit for copse and spring woods; or, by reducing them to one stem, render them, in a very few years, fit for the turner. For,

2. Though Birch be of all other the worst of timber, yet has it its various uses; as for the husbandman's ox-yoaks; also for hoops, small screws, paniers, brooms, wands, bavin-bands, and withs for fagots; it

N O T E S.

Of this genus there are five species.

1. *BETULA (Alba) foliis ovatis acuminatis serratis. Hort. Cliff. 442. Birch-tree with oval sawed leaves ending in points. The Common Birch-tree.*

This is the common Birch, a tree of humble growth; but nevertheless, if permitted, will grow to a tolerable size. It is excellently well calculated to diversify the scene, and makes a pleasing variety among other trees, either in winter or summer. In the summer it is covered over with beautiful small leaves, which are of a pleasant green, and by every breeze of air are pleasingly waved on their slender twigs. In the winter it appears conspicuous, presenting itself with its body covered over with a whitish bark, which has a good effect. These trees, therefore, may be planted in parks, lawns, &c. to encrease the variety, as well as in woods or coppices, to be cut for profit.—The lopping of the Birch makes excellent fuel, as well as the best of brooms. The bark is of a very durable nature: the Swedes cover their houses with it, and it lasts many years. The

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claims a memory for arrows, bolts, shafts, our old English artillery; also for dishes, bowls, ladles, and other domestic utensils, in the good old days of more simplicity, yet of better and truer hospitality. In New-England our Northern Americans make canoes, boxes, buckets, kettles, dishes, (which they sew and join very curiously with thread made of Cedar-roots) and divers other domestical utensils, as baskets, bags, with this tree, whereof they have a blacker kind; and of a certain fungous excrescence from the bole, after being boiled, beaten, and dried in an oven, they make excellent spunk or touch-wood, and balls to play withal; it is astringent, and being reduced to powder, is an infallible remedy in the hæmorrhoids. They make also not only this small ware, but even small craft, pinnaces, of Birch: Ribbing them with white Cedar, and covering them with large flakes of Birch-bark, they sew them with thread of spruce-

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inner fine bark was, before the invention of paper, used for writing; and of the sap is made a wholesome wine; salutary, it is said, for such as are afflicted with the stone and gravel.

2. *BETULA (Nana) foliis orbiculatis crenatis.* Flor. Lap. 266. *Birch-tree with round crenated leaves.* *Betula pumila foliis subrotundis.* Amman. *Dwarf Birch.*

This sort grows naturally in the northern parts of Europe, and upon the Alps; it seldom rises above two or three feet high, having slender branches, garnished with round leaves, and rarely produces either male or female flowers here. It is preserved in some curious gardens for the sake of variety, but is a plant of no use.

3. *BETULA (Lenta) foliis cordatis oblongis acuminatis serratis.* Lin. Sp. Pl. 1394. *Birch-tree with oblong, pointed, heart-shaped, sawed leaves.*

This grows to a timber-tree of sixty or more feet in height. The leaves are heart-shaped, oblong, smooth, of a thin consistence, pointed and very sharply serrated. The varieties of this species differ in colour, and go by the names of, 1. Dusky Canada Birch; 2. White Paper Birch; 3. Poplar-leaved Canada Birch; 4. Low-growing Canada Birch, &c. The bark of this species is very light, tough, and durable; and the inhabitants of America use it for canoes.

4. *BETULA (Nigra) foliis rhombeo-ovatis acuminatis duplicato-serratis.* Lin. Sp. Plant. 1394. *Birch-tree with rhomboid, oval, pointed leaves, which are doubly sawed.* *Betula nigra Virginiana.* Pluk. Alm. 67. *Black Virginia Birch-tree.*

This being of foreign growth, is propagated for wilderness and ornamental plantations; but as it begins now to become pretty common, it is to be hoped it will soon make a figure among our forest-trees, it being equally hardy with our common Birch, and will arrive at a much greater magnitude.—This species will grow

roots, and pitch them, as it seems we did even here in Britain, as well as CH. XVIII.
the Veneti, making use of the Willow: Whereof Lucan,

Primum cana salix madefacto vimine parvam
Texitur in puppim, cæsoque induta juvenco,
Vectoris patiens, tumidum super emicat amnem.
Sic Venetus stagnante Pado, fusoque Britannus
Navigat Oceano ———

When Sicoris to his own banks restor'd,
Had quit the field, of twigs and Willow-board
They build small craft, cover'd with bullock's hide,
In which they reach'd the river's farther side:
So sail the Veneti, if Padus flow;
The Britains sail on their rough ocean so.

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to upwards of sixty feet in height. The branches are spotted, and more sparingly set on the trees than the common-forts. The leaves are broader, grow on long foot-stalks, and add a dignity to the appearance of the tree. — There are several varieties of this species, differing in the colour, size of the leaves, and shoots; all of which have names given them by nurserymen, who propagate the different sorts for sale; such as, 1. The Broad-leaved Virginian Birch; 2. The Poplar-leaved Birch; 3. The Paper Birch; 4. The Brown Birch, &c.

5. *BETULA* (*Alnus*) *Pedunculis ramosis*. Lin. Sp. Pl. 1394. In the Flor. Lapponic. it is termed simply, *Alnus*. Caspar Bauhine calls it, *Alnus rotundi-folia glutinosa viridis*; also, *Alnus folio incano*; and, *Alnus folio oblongo viridi*. The Common Alder.

Linnæus has thought proper to class this tree with the Birch; but as Mr. Evelyn makes a separate chapter of it, I have in this place only mentioned its botanical description.

In the Linnæan System the *Betula* belongs to the class and order *Monocæcia Tetandria*, there being male and female flowers separately on the same plant, the male having four stamina. In general, the leaves are fully displayed by the beginning of April. The flowers appear in blow about the twenty-seventh of the same month; and about the eleventh of September the catkins are formed.

There are two good ways of propagating this tree, either by layers or seeds. If from seeds, they should be carefully gathered in the autumn, before they drop from their scales, which will happen soon after they begin to open. These should be sown in the seminary, about a quarter of an inch deep; and, after they are come up, should be carefully cleaned from weeds for the first summer. The spring following

Book I. It also makes good fuel. In many of the mosses in the West-Riding of Yorkshire are often dug up Birch-trees that burn and flame like Fir and Candle-wood; and I think Pliny says, the Gauls extracted a sort of bitumen out of Birch. Great and Small Coal are made by the charring of this wood, (see Book iii. chap. iv. of Fuel) as of the tops and loppings, Mr. Howard's new Tan. The inner white cuticle and silken bark (which strips off of itself almost yearly) was antiently used for writing-tables, before the invention of paper; there is a Birch-tree in Canada, whose bark

See Philosoph.
Transf. vol. ix.
N^o. cv. p. 93.

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they may be planted out in the nursery: The rows must be two feet and a half asunder, and the plants a foot and a half distant in the rows. Here they may remain till they are of a sufficient size to be planted out for good.

Whoever has not the conveniency of procuring the seeds, may soon raise a great quantity by layers from very few stools. Having planted some stools for this purpose, and having headed them down to the ground, let them remain two years before they are layered. By this time each branch will have a great quantity of side-shoots, which being splashed and laid in the ground, every twig will grow, and make a fine plant, fit to be planted out in the nursery by the autumn following. These plants should be taken from the stools, and planted as the seedlings; and the stools ought to be refreshed with the knife, by taking off the old splashed wood, and preparing them to throw out vigorous fresh shoots for a second operation, which should be repeated every two years.

After the plants are of a size fit to be set out for good, they may be planted upon almost any ground with success; for the Birch, being a native of Britain, suits itself to all sorts of soils. It will thrive extremely well on barren land, whether it be wet or dry, sandy or stony, marshy or boggy. It sows itself, and will come up in places where hardly any other tree will grow. To what advantage, then, may many parts of this island be planted with this tree, particularly such as have the advantage of large rivers, where the wood may be sent off by water; for where water-carriage may be had, the broom-man will be a constant purchaser.

Whenever coppices of the Birch are planted, with a design to be sold to the broom-men, the plants should be taken out of the nursery, or gathered in the woods, and set five feet asunder; and in eight years they will be ready to cut; when an acre, if it has succeeded well, will be worth about ten pounds. After this, the trees may be cut every six years, when the acre will be of the same value. If plantations of this tree are intended for hoops and smaller uses of husbandry, they will support a cutting for these purposes every twelfth year, and will be worth more than twelve pounds per acre. Thus may such lands as are not worth a shilling an acre be improved with Birch-trees; an improvement so much the greater, as the nature of the tree will admit of its being raised and planted out at a very small expence. When the land is good enough to admit of the plow, a crop of corn is the best preparation for a Birch plantation; but where this cannot be done, the plants may be taken out of the nursery, when they are out of the reach of weeds, and then planted; and no farther care need be taken

will serve to write on, and may be made into books, and of the twigs very pretty baskets; with the outward thicker and coarser part of the common Birch, are divers houses in Russia, Poland, and those poor northern tracts, covered, instead of slates and tile: Nay, one who has lately published an

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of them than keeping out cattle, till they are fit for cutting. The best season for planting out the Birch, if it be on dry ground, is autumn; but if it be in a wet soil, the spring is preferable.

So much for the cultivation of the Common Birch; let us now give directions for the propagation of the foreign kinds: These may be raised from seeds and layers. We receive the seeds from America, where they are natives; when sown in beds of fine mould, and covered about a quarter of an inch deep, they will generally grow.

During the time the plants are in the seminary, they must be constantly weeded and watered in dry weather; and when they are one or two years old, according to their strength, they should be planted in the nursery, in rows, in the usual manner. Weeding must always be observed in summer, and digging between the rows in winter; and when they are about a yard or four feet high, they will be of a good size to be planted out for the wilderness-quarters.

The propagation by layers, is the way to continue the varieties of the different sorts. A sufficient number of plants should be procured for this purpose, and set on a spot of double-dug ground, three yards distant from each other. The year following, if they have made no young shoots, they should be headed to within half a foot of the ground, to form the stools, which will then shoot vigorously the summer following; and in the autumn the young shoots should be splashed near the stools, and the tender twigs layered near their ends. They will then strike root, and become good plants by the autumn following; whilst fresh twigs will have sprung up from the stools, to be ready for the same operation. The layers, then, should be taken up, and the operation performed afresh. If the plants designed for stools have made good shoots the first year, they need not be headed down, but splashed near the ground, and all the young twigs layered. Thus may an immediate crop be raised this way; whilst young shoots will spring out in great plenty below the splashed part, in order for layering the succeeding year. This work, therefore, may be repeated every autumn or winter; when some of the strongest layers may be planted out, if they are immediately wanted; whilst the others may be removed into the nursery, to grow to be stronger plants, before they are removed to their destined habitations.

Cuttings also, if set in a moist shady border the beginning of October, will frequently grow: But as this is not a sure method, and as these trees are so easily propagated by layers, it hardly deserves to be put into practice.

In Sweden the budding and leafing of the Birch-tree is considered as a directory for sowing barley; and as there is something extremely sublime and harmonious in the idea, I flatter myself an account of it will be acceptable.

Mr. Harold Barck, in his ingenious dissertation upon the foliation of trees, published in the Amœn. Acad. vol. III. informs us, that the illustrious Linnæus had, in the

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account of Sweden, says, that the poor people grind the very bark of Birch-trees to mingle with their bread-corn. It is affirmed by Cardan, that some Birch-roots are so very extravagantly veined, as to represent the shapes and images of beasts, birds, trees, and many other pretty resemblances. Lastly, of the whitest part of the old wood, found commonly in doating Birches, is made the grounds of our effeminate farined Gallants sweet powder; and of the quite consumed and rotten (such as we find reduced to a kind of reddish earth in superannuated hollow trees) is gotten the best mould for the raising of divers seedlings of the rarest plants and flowers; to say nothing here of the Magisterial Fasces, for which antiently

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most earnest manner, exhorted his countrymen to observe, with all care and diligence, at what time each tree expands its buds and unfolds its leaves; imagining, and not without reason, that his country would, some time or other, reap some new and perhaps unexpected benefit from observations of this kind made in different places.

As one of the apparent advantages, he advises the prudent husbandman to watch, with the greatest care, the proper time for sowing; because this, with the divine assistance, produces plenty of provision, and lays the foundation of the public welfare of the state, and of the private happiness of the people. The ignorant farmer, tenacious of the ways and customs of his ancestors, fixes his sowing season generally to a month, and sometimes to a particular week, without considering whether the earth be in a proper state to receive the seed; from whence it frequently happens that what the sower sowed with sweat, the reaper reaps with sorrow. The wise economist should therefore endeavour to fix upon certain signs whereby to judge of the proper time for sowing. We see trees open their buds and expand their leaves, from whence we conclude that spring approaches, and experience supports us in the conclusion; but no body has as yet been able to shew us what trees providence has intended should be our kalendar, so that we might know on what day the countryman ought to sow his grain. No one can deny but that the same power which brings forth the leaves of trees, will also make the grain vegetate; nor can any one assert that a premature sowing will always, and in every place, accelerate a ripe harvest. Perhaps therefore we cannot promise ourselves a happy success by any means so likely, as by taking our rule for sowing from the leafing of trees. We must for that end observe in what order every tree puts forth its leaves according to its species, the heat of the atmosphere, and the quality of the soil. Afterwards, by comparing together the observations of the several years, it will not be difficult to determine, from the foliation of the trees, if not certainly, at least probably, the time when annual plants ought to be sown. It will be necessary likewise to remark what sowings made in different parts of the spring produce the best crops, in order that, by comparing these with the leafing of trees, it may appear which is the most proper time for sowing.

To these most ingenious remarks, Mr. Barck has added the order of the leafing of trees in Sweden. Mr. Stillingfleet is the only person that has made correct observations

the cudgels were used by the Lictor, as now the gentler rods by our tyrannical Pædagogues for lighter faults.

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3. I should here add the uses of the water too, had I full permission to tamper with all the medicinal virtues of trees; but if the sovereign effects of the juice of this despicable tree supply its other defects, (which make some judge it unworthy to be brought into the catalogue of woods to be propagated) I may perhaps, for once, be permitted to play the empiric, and to gratify our laborious woodman with a draught of his own liquor; and the rather, because these kind of secrets are not yet sufficiently cultivated; and ingenious planters should by all means be encouraged to make more trials of this nature, as the Indians and other nations have done on their Palms and trees of several kinds, to their great emolument. The mystery is no more than this: About the beginning of March, (when the buds begin to be proud and turgid and before they explain into leaves) with a chisel and mallet, cut a slit almost as deep as the very pith, under some bough or branch of a well-spreading Birch; cut it oblique, and not long-ways, (as a good Surgeon would make his orifice in a vein) inserting

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upon the foliation of the trees and shrubs of this kingdom. The following is his kalendar, which was made in Norfolk in the year 1765.

1 Honey-suckle Jan. 15	13 Filberd - - April 7	25 Chesnut - April 16
2 Gooseberry March 11	14 Sallow - - - - 7	26 Willow - - - - 17
3 Currant - - - - 11	15 Alder - - - - 7	27 Oak - - - - 18
4 Elder - - - - 11	16 Sycamore - - - - 9	28 Lime - - - - 18
5 Birch - - - April 1	17 Elm - - - - 10	29 Maple - - - - 19
6 Weeping Willow - 1	18 Quince - - - - 10	30 Walnut - - - - 21
7 Raspberry - - - 3	19 Marsh Elder - - 11	31 Plane - - - - 21
8 Bramble - - - - 3	20 Wych Elm - - - 12	32 Black Poplar - 21
9 Briar - - - - 4	21 Quicken-tree - - 13	33 Beech - - - - 21
10 Plumb - - - - 6	22 Hornbeam - - - 13	34 Acafia Robinia - 21
11 Apricot - - - - 6	23 Apple-tree - - - 14	35 Ash - - - - 22
12 Peach - - - - 6	24 Abele - - - - 16	36 Carolina Poplar - 22

In different years, and in different soils and expositions, these trees and shrubs vary as to their leafing; but they are invariable as to their succession, being bound down to it by nature herself. A farmer, therefore, who would use this sublime idea of Linnaeus, should diligently mark the time of budding, leafing, and flowering of different plants. He should also put down the days on which his respective grains were sown; and, by comparing these two tables for a number of years, he will be enabled to form an exact kalendar for his spring corn. An attention to the discolouring and falling of the leaves of plants, will assist him in sowing his winter grain, and teach him how to

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a small stone or chip, to keep the lips of the wound a little open. Sir Hugh Platt (giving a general rule for the gathering of sap and tapping of trees) would have it done within one foot of the ground, the first rind taken off, and then the white bark slit over-thwart, no farther than to the body of the tree: Moreover, that this wound be made only in that part of the bark which respects the fourth, west, or between those quarters; because, says he, little or no sap riseth from the northern, nor indeed when the east wind blows. In this slit, by the help of your knife to open it, he

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guesses at the approach of winter. Towards the end of September, which is the best season for sowing wheat, he will find

The leaves of the Plane-tree, tawney;	The leaves of the Elm, orange;
— of the Oak, yellowish green;	— of the Hawthorn, tawney
— of the Hæfel, yellow;	— yellow;
— of the Sycamore, dirty brown;	— of the Cherry, red;
— of the Maple, pale yellow;	— of the Hornbeam, bright
— of the Ash, fine lemon;	— yellow;

There is a certain kind of genial warmth which the earth should enjoy at the time the seed is sown*. In the animal world we observe this in the most convincing manner. In brutes the symptoms of that period are plainly marked. The budding, leafing, and flowering of plants, seem to indicate the same happy temperature of the earth. “Vere tument terræ et genitalia femina poscunt.”

Appearances of this sublime nature may be compared to the writing upon the wall, which was seen by many, but understood by few. They seem to constitute a kind of harmonious intercourse between God and man. They are the silent language of the Deity.

The ingenious and indefatigable Mr. Young has endeavoured to ascertain the time of sowing by another method. His experiments are accurately conducted, and his conclusions from them fairly drawn; but it were to be wished that he had interwoven the idea of Linnæus with his own experiments; we should then have had an unerring rule to go by. The temperature of the season, with respect to heat and cold, drought and wet, differs in every year. Experiments made this year cannot determine, with certainty, for the next. They may assist, but cannot be conclusive. The hints of Linnæus constitute an universal rule for the whole world, because trees, shrubs, and herbs, bud, leaf, flower, and shed their leaves, in every country, according to the difference of seasons.

* In the North of England, when the soil turns up with a mellow and crumbly appearance, and smokes, the farmers say the earth is *brimming*. This state is but of short duration, and shews the exact time when the seed should be sown. This appearance will ever coincide with the budding, leafing, flowering, &c. of some plants that grow in the field. The husbandman should therefore, at that time, make his observations, in order to form his calendar of Flora.

directs that a leaf of the tree be inserted, first fitted to the dimensions of the slit, from which the sap will distil in manner of filtration. Take away the leaf, and the bark will close again, a little earth being clapped to the slit. Thus the Knight, for any tree. But we have already shewed how the Birch is to be treated: Fasten therefore a bottle, or some such convenient vessel appendant; this does the effect as well as perforation or tapping: Out of this aperture will extil a limpid and clear water, retaining an obscure sinack both of the taste and odor of the tree; which (as I am credibly informed) will, in the space of twelve or fourteen days, preponderate, and outweigh the whole tree itself, body and roots; which if it be constant, and so happen likewise in other trees, is not only stupendous, but an experiment worthy the consideration of our profoundest philosophers: *An ex sola aqua fiunt arbores?* Whether water only be the principle of vegetables, and consequently of trees. I say, I am credibly informed; and therefore the late unhappy angry man* might have spared his animadversion: For he that said but twenty gallons run, does he know how many more might have been gotten out of larger apertures, at the insertion of every branch and foot in the principal roots during the whole season? But I conceive I have good authority for my assertion, out of the author cited in the margin†, whose words are these: *Si mense Martio perforaveris Betulam exstillabit aqua limpida, clara, & pura, obscurum arboris saporem & odorem referens, quæ, spacio xii aut xiv dierum, præponderabit arbori cum ramis & radicibus.* His exceptions about the beginning of March are very insignificant, since I undertake not punctuality of time; and his own pretended experience shewed him, that in hard weather it did not run till the expiration of the month, or beginning of April, and another time on the tenth of February; and usually, he says, about the twenty-fourth day, &c. at such uncertainty: What immane difference then is there between the twenty-fourth of February and commencement of March? Besides, these anomalous bleedings, even of the same tree, happen early or later, according to the temper of the air and weather. In the mean time, evident it is, that we know of no tree which does more copiously attract, be it that so much celebrated spirit of the world, as they call it, in form of water, (as some) or a certain specifick liquor richly impregnated with this balsamical property: That there is such a magnes in this simple tree, as does manifestly draw to itself some occult and wonderful virtue, is notorious; nor is it conceivable indeed, the difference between the efficacy of that liquor which distils from the bole, or parts of the tree nearer to the root, (where Sir Hugh would celebrate the incision) and that which weeps

* Dr. Stubb.

† *Aditus novus ad Occultas Sympathie & Antipathie causas inventas, &c. à Silvestro Ratray, M. D. Glasguensi. 1658, p. 55.*

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out from the more sublime branches, more impregnated with this astral virtue, as not so near the root, which seems to attract rather a cruder and more common water, thro' fewer strainers, and neither so pure and aerial as in those refined percolations, the nature of the places where these trees delight to grow (for the most part lofty, dry, and barren) considered. But I refer these disquisitions to the Learned especially, as mentioned by that incomparable Philosopher, and my most noble friend, the Hon. Mr. Boyle, in his Second Part of the Usefulness of Natural Philosophy, Sect. i. Ess. iii. where he speaks of the Manna del Corpo, or Trunk-manna, as well as of that liquor from the bough; also of the Sura, which the Cocoa-trees afford; and that Polonian secret of the liquor of the Walnut-tree root; with an encouragement of more frequent experiments, to educe saccharine substances upon these occasions: But the book being published so long since, this discourse was first printed, I take only here the liberty to refer the reader to one of the best entertainments in the world.

But now, before we expatiate farther concerning saps, it is by some controverted, whether this exhaustion would not be an extreme detriment to the growth, substance, and other parts of trees: As to the growth and bulk, if what I have observed of a Birch, which has for very many years been perforated at the usual season, besides the scars made in the bark, it still thrives, and is grown to a prodigious substance, the species considered. What it would effect in other trees, the Vine excepted unseasonably lanced, I know not: But this calls to mind a trial of 'Squire Brotherton (mentioning some excortications and incisions, by what he observed in pruning) that most, if not all, of the sap ascends by the lignous part of trees, not the cortical, nor between the cortical and lignous; and that the increase of a tree's growth in thickness, is by the descent of the sap, and not by the ascent; so as if there were no descent, the tree would increase very little, if at all; for that there is a perpetual circulation of the sap, during the whole summer; and whilst it is in this course, and not a descent, at Michaelmas only, as some hold, but evaporated by the branches, during summer and autumn, and at spring supplied with rains: He also thinks it probable that the bodies of plants, as well as those of animals, are nourished and increased by a double pabulum or food, as water and air both impregnated, mixing and coalescing by a mutual conversion.

That all plants and animals seem to have a twofold kind of roots, one spreading into the earth, the other shooting up into the air; which, as they

receive and carry up their proper nutriments to the body of the plant and root, so they carry off the useless dregs and recrements, &c. But this curious note seeming fitter to have been placed in our chapter of pruning (upon which this learned Gentleman has given us his experience) I beg pardon for this diverticle, and return to my subject.

4. But whilst the second edition was under my hand, there came to me divers papers upon this subject, experimentally made by a worthy friend of mine, a learned and most industrious person, which I had here once resolved to have published, according to the generous liberty granted me for so doing; but understanding he was still in pursuit of that useful and curious secret, I changed my resolution into an earnest address, that he would communicate it to the world himself, together with those other excellent enquiries and observations, which he is adorning for the benefit of planters, and such as delight themselves in those innocent rusticities. I will only, by way of corollary, hint some particulars for the satisfaction of the curious; and especially that we may in some sort gratify those earnest suggestions and queries of the late most obliging publisher* of the Philosophical Transactions, to whose indefatigable pains the learned world has been infinitely engaged. In compliance therefore to his queries, Monday, October 19, 1668, N^o. xl. p. 797, 801, &c. these generals are submitted: That in such trials, as my friend essayed, he has not yet encountered with any sap but what is very clear and sweet, especially that of the Sycamore, which has a dulcoration as if mixed with sugar, and that it runs one of the earliest: That the Maple distilled when quite rescinded from the body, and even whilst he yet held it in his hand: That the Sycamore ran at the root, which some days before yielded no sap from the branches, the experiment made at the end of March: But the accurate knowledge of the nature of sap, and its periodic motions and properties in several trees, should be observed by some at entire leisure to attend it daily, and almost continually, and will require more than any one person's industry can afford; for it must be enquired concerning every tree, its age, soil, situation, &c. the variety of its ascending sap depending on it; and then of its sap ascending in the branches and roots; descending in cut branches; ascending from root, and not from branches; the seasons and difference of time in which those accidents happen, &c. He likewise thinks the best expedient to procure store of liquor, is to cut the trees almost quite through all the circles, on both sides the pith, leaving only the outmost circle, and

* Mr. Oldenburg.

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the barks on the north or north-east side unpierced; and this hole, the larger it is bored the more plentifully it will distil; which if it be under and through a large arm near the ground, it is effected with greatest advantage, and will need neither stone nor chip to keep it open, nor spigot to direct it to the recipient. Thus it will, in a short time, afford liquor sufficient to brew with; and in some of these sweet saps, one bushel of malt will afford as good ale as four in ordinary waters, even in March itself; in others, as good as two bushels; for this, preferring the Sycamore before any other: But to preserve it in best condition for brewing, till you are stored with a sufficient quantity, it is advised, that what first runs be isolated and placed in the sun, till the remainder be prepared, to prevent its growing sour; but it may also be fermented alone, by such as have the secret. To the curious these essays are recommended: That it be immediately stopped up in the bottles in which it is gathered, the corks well waxed and exposed to the sun, till, as was said, a sufficient quantity be run; then let so much rye-bread (toasted very dry, but not burnt) be put into it, as will serve to set it a working; and when it begins to ferment; take it out, and bottle it immediately. If you add a few cloves, &c. to steep in it, it will certainly keep the year about: It is a wonder how speedily it extracts the taste and tincture of the spice. Mr. Boyle proposes a sulphureous fume to the bottles: Spirit of wine may haply not only preserve, but advance the virtues of saps; and infusions of raisins are obvious, and without decoction best, which does but spend the more delicate parts: Note, that the sap of the Birch will make excellent mead.

5. To these observations, that of the weight and virtue of the several juices, would be both useful and curious: As, whether that which proceeds from the bark, or between that and the wood, be of the same nature with that which is supposed to spring from the pores of the woody circles? And whether it rise in like quantity, upon comparing the incisions? All which may be tried, first attempting through the bark, and saving that apart, and then perforating into the wood, to the thickness of the bark, or more, with a like separation of what distils. The period also of its current would be calculated; as how much proceeds from the bark in one hour; how much from the wood or body of the tree; and thus every hour, with still a deeper incision with a good large auger, till the tree be quite perforated; then by making a second hole within the first, fitted with a lesser pipe, the interior heart-sap may be drawn apart, and examined by weight, quantity, colour, distillation, &c. and if no difference perceptible be detected,

the presumption will be greater, that the difference of heat and sap in timber, is not from the sap's plenty or penury, but the season; and then possibly the very season of squaring, as well as felling of timber, may be considerable to the preservation of it.

6. The notice likewise of the sap's rising more plentifully and constantly in the sun than shade, more in the day than night, more in the roots than branch, more southward, and when that and the west wind blows, than northward, &c. may yield many useful observations: As for planting, to set thicker or thinner, (*si cetera sint paria*) namely, the nature of the tree, soil, &c. and not to shade overmuch the roots of those trees whose stems we desire should mount, &c. That in transplanting trees we turn the best and largest roots towards the south, and consequently the most ample and spreading part of the head correspondent to the roots: For if there be a strong root on that quarter, and but a feeble attraction in the branches, this may not always counterpoise the weak roots on the north-side, damaged by the too puissant attraction of our large branches: This may also suggest a cause why trees flourish more on the south-side, and have their integument and coats thicker on those aspects annually, with divers other useful speculations, if in the mean time they seem not rather to be puntillos over nice for a plain forester. Let the curious further consult the Philosophical Transactions, N°. xliii, xlv, xlviii, lvii, lviii, lxxiii, lxx, lxxi, for farther instances and trials upon this subject of sap; also that excellent treatise of Hen. Meibomius, *De Cerevisiis Potibusque & Ebriaminibus extra Vinum*, annexed to *Turnebus de Vino &c.* where he shews how, and by whom, after the first use of water and milk, were introduced the drinks made from vegetables, vines, corn, fruits, and juices tapped out of trees.

7. To shew our reader yet, that these are no novel experiments, we are to know, that a large tract of the world almost altogether subsists on these green liquors, especially that of the Date, which being grown to about seven or eight feet in height, they wound, as we have taught, for the sap, which they call toddy, a very famous drink in the East-Indies: This tree increasing every year about a foot, near the opposite part of the first incisure, they pierce again, changing the receiver; and so still, by opposite wounds and notches, they yearly draw forth the liquor, till it arrive to near thirty feet upward, and of these they have ample groves and plantations, which they set at seven or eight feet distance; but then they use to percolate what they extract through a stratum made of the rind of the

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tree, well contused and beaten, before which preparation it is not safe to drink it; and it is observed that some trees afford a much more generous wine than others of the same kind. In the Cocoa and Palmeto trees, they chop a bough, as we do the Betula; but in the Date, make the incision with a chisel in the body very neatly, in which they stick a leaf of the tree, as a lingula to direct it into the appendant vessel.

De Lithiasi,
c. viii. n. 24,
25, &c.

8. The liquor of the Birch is esteemed to have all the virtues of the spirit of salt, without the danger of its acrimony; most powerful for the dissolving of the stone in the bladder, bloody water, and strangury: Helmont shews how to make a beer of the water; but the wine is a most rich cordial, curing, as I am told, consumptions, and such interior diseases as accompany the stone in the bladder or reins. The juice decocted with honey and wine, Dr. Needham affirms he has often cured the scorbut with. This wine, exquisitely made, is so strong, that the common sort of stone bottles cannot preserve the spirits, so subtle they are and volatile; and yet it is gentle, and very harmless in operation within the body, and exceedingly sharpens the appetite, being drunk ante pastum: I will present you with a receipt, as it was sent me by a fair Lady, which I have often, and still make use of.

9. To every gallon of Birch-water put a quart of honey, well stirred together; then boil it almost an hour with a few cloves, and a little lemon peel, keeping it well scummed; when it is sufficiently boiled, and become cold, add to it three or four spoonfuls of good ale to make it work, which it will do like new ale; and when the yeast begins to settle, bottle it up as you do other winy liquors. It will, in a competent time, become a most brisk and spirituous drink, which, besides the former virtues, is a very powerful openèr, doing wonders for cure of the phthysic: This wine may, if you please, be made as successfully with sugar, instead of honey, one pound to each gallon of water; or you may dulcify it with raisins, and compose a raisin-wine of it. I know not whether the quantity of the sweet ingredients might not be somewhat reduced, and the operation improved: But I give it as received. The author of the Vinetum Brit. boils it but a quarter or half an hour, then setting it a cooling, adds a very little yeast to ferment and purge it; and so barrels it with a small proportion of cinnamon and mace bruised, about half an ounce of both to ten gallons, close stopped, and to be bottled a month after. Care must be taken to set the bottles in a very cool place, to preserve them from flying;

and the wine is rather for present drinking than of long duration, unless CH. XVIII.
the refrigeratory be extraordinarily cold. The very smell of the first
springing leaves of this tree, wonderfully recreates and exhilarates the
spirits.

10. But besides these, Beech, Alder, Ash, Sycamore, Elder, &c. should
be attempted for liquors: Thus Crabs, even our very Brambles, may possi-
bly yield us medical and useful wines. The Poplar was heretofore esteem-
ed more physical than the Betula. The sap of the Oak, juice or decoction
of the inner bark, cures the fashions, or farcy, a virulent and dangerous
infirmity in horses, and which, like cancers, are reputed incurable by any
other topic than some actual or potential cautery. But what is more
noble, a dear friend of mine assured me, that a country neighbour of his,
at least fourscore years of age, who had lain sick of a bloody strangury,
(which by cruel torments reduced him to the very article of death) was,
under God, recovered to perfect and almost miraculous health and strength,
so as to be able to fall stoutly to his labour, by one sole draught of beer,
wherein was the decoction of the internal bark of the Oak-tree*; and I
have seen a composition of an admirable sudorific and diuretic for all affec-
tions of the liver, out of the like of the Elm, which might yet be drunk
daily as our Coffee is, and with no less delight: But quacking is not my
trade; I speak only here as a plain husbandman and a simple forester, out
of the limits whereof I hope I have not unpardonably transgressed. Pan
was a physician, and he, you know, was president of the woods. But I
proceed to the Alder.

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* This decoction is very proper in the complaint mentioned, when there is reason
to suspect the cause to be a dissolved state of the blood, which is often the case; but
when the bloody urine proceeds from the irritation of a stone in the kidneys or bladder,
this remedy will rather aggravate than mitigate the disease.

C H A P. XIX.

The ALDER *.

BOOK I.

1. **A**LNUS, the Alder, is of all other the most faithful lover of watery and boggy places, and those most despised weeping parts, or water-galls of forests; — *crassique paludibus Alni*; for in better and drier ground they attract the moisture from it, and injure it. They are propagated of truncheons, and will come of seeds (for so they raise them in Flanders, and make wonderful profit of the plantations) like the Poplar; or of roots, which I prefer, being set as big as the small of one's leg, and in length about two feet, whereof one should be plunged in the mud. This profound fixing of aquatick trees is recommended to preserve them steady, and safe from the concussions of the winds, and violence of waters, in their liquid and slippery foundations. They may be placed at four or five feet distance, and when they have struck root, you may cut them, which will cause them to spring in clumps, and to shoot out into many useful poles. But if you plant smaller sets, cut them not till they are arrived to some competent bigness,

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* According to the system of the celebrated Linnæus, this tree is classed with the Birch, under the title of *Betula* (*Alnus*) *pedunculis ramosis*. Caspar Bauhine calls it *Alnus folio incano*; and *Alnus folio oblongo viridi*.

The flowers of the Alder-tree are in full blow about the twenty-sixth of March. They are male and female separately on the same plant, and the stamina are four, which shews it to belong to the class and order *Monoecia Tetrandria*. The catkins are formed about the sixteenth of September. The flowers have no beauty to recommend the tree, affording pleasure only to the botanist, and curious observer of Nature; but the leaves are moderately large, and of a deep green: The bark also being smooth, and of a purplish colour, makes this tree have an agreeable effect among others, in all sorts of plantations of the watery tribe. The leaves begin to open about the seventh of April.

The Alder is generally planted for coppice-wood, to be cut down every ninth or tenth year for poles. These coppices are raised either from truncheons or young trees, the latter of which I greatly prefer. In order to obtain a quantity of trees for this purpose, some suckers should be taken out of the meadows where the Alder-trees grow. These should be planted on a prepared piece of ground, and afterwards headed down for stools. By the succeeding autumn they will have shot out many young branches, which may be laid in the ground; and by that time twelvemonth they will have taken root, when they should be removed from the stools, and planted in rows, to acquire a



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J. Miller del. sc.

and that in a proper season, which is, for all the aquaticks and soft woods, not till winter be well advanced, in regard of their pithy substance: Therefore, such as you shall have occasion to make use of before that period, ought to be well grown, and felled with the earliest, and in the first quarter of the increasing moon, that so the successive shoot receive no prejudice. Some, before they fell, disbark their Alders, and other trees; of which see book iii. chap. iii. But there is yet another way of planting Alders after the Jersey manner, and as I received it from a most ingenious Gentleman of that country, which is, by taking truncheons of two or three feet long, at the beginning of winter, and to bind them in fagots, and place the ends of them in water, till towards the spring, by which season they will have contracted a swelling spire, or knur, about that part, which being set, does (like the Gennet-moil Apple-tree) never fail of growing and striking root. There is a black sort more affected to woods, and drier grounds, and bears a black berry, not so frequently found; yet growing somewhere about Hampstead, as the learned Dr. Tancred Robinson observes.

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sufficient height to be above the weeds, when planted in the places where they are to remain. In one or two years they will be strong enough to be planted out for good. If the coppice is to stand upon boggy or watery ground, they may be removed from the nursery, and planted at three feet asunder, the holes having been previously prepared to receive them. Here they may stand for six or seven years; when every other tree should be taken away, and the rest cut down for stools. The stools will then be six feet asunder; and as each stool will throw out many young branches for poles, they ought not to stand at a nearer distance. Every ninth or tenth year will afford a fall of these trees for poles; and in performing this operation, they should be taken off smooth and fine, so that the stool may not be damaged, or hindered from producing a fresh crop.

The other less eligible method, though perhaps least expensive, is performed by planting truncheons three feet long.—Two of these feet must be thrust into the ground, having first widened a hole with a crow, or some such instrument, to prevent the bark being rubbed off by the soil. These should be set at the distance of one yard. But, at the time of the first fall, the planter must not expect to remove every other tree: Many of the truncheons will not grow; neither have I ever seen a coppice, raised in this way, so luxurious and beautiful as when raised from regular plants.

After these truncheons are planted, the weeds should be kept down till they are shot out of their reach; and after every fall, in the following winter, the stools ought to be looked over, and all the weak side-branches taken off. This will strengthen

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2. There are a sort of husbands who take excessive pains in stubbing up their Alders, wherever they meet them in the boggy places of their grounds, with the same indignation as one would extirpate the most pernicious of weeds; and when they have finished, know not how to convert their best lands to more profit than this (seeming despicable) plant might lead them to, were it rightly understood: Besides, the shadow of this tree does feed and nourish the very grass which grows under it; and being set, and well plashed, is an excellent defence to the banks of rivers; so as I wonder it is not more practised about the Thames, to fortify and prevent the mouldering of the walls from the violent weather they are exposed to.

3. You may cut aquatick trees every third or fourth year, and some more frequently, as I shall shew you hereafter. They should also be abated within half a foot of the principal head, to prevent the perishing of the main stock, and besides to accelerate their sprouting. In setting the fruncheons, it were not amiss to prepare them a little after they are fitted to the size, by laying them a while in water; this is also practicable in Willows, &c.

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those which are already the strongest, and will enable them to shoot up more vigorously for poles.

Alders planted by the sides of rivers, brooks, &c. may be cut every eight or ten years, which will produce good profit, as well as keep the river in its proper channel.

The Alder-tree will grow to the height of about thirty-five or forty feet, and its timber is very valuable for works intended to lie constantly under water, where it will harden, and last for ages. It is said to have been used under the Rialto at Venice; and we are told that the morasses about Ravenna were piled with this timber, in order to lay the foundations for building upon.

This tree admits of some varieties which are sought after for curious collections; such as, 1. The Long-leaved American Alder; 2. The White Alder; 3. The Black Alder; 4. The Hoary-leaved Alder; 5. The Dwarf Alder. This last grows upon bogs, and is with difficulty preserved in gardens, unless the soil be naturally moist and wet. The others have names assigned them from the different colours of the leaves and bark, except the first sort, which receives its title from the length of its leaves. This beautiful variety grows to about thirty feet in height, and merits a place in the choicest collections. It may be propagated by layers or cuttings. The branches are slender, smooth, numerous, and of a dark-brown or purple colour. The leaves are long, and free from that clammy or glutinous matter which is peculiar to those of the common Alder. They are smooth, oval, spear-shaped, indented, and give the tree an air of

4. Of old they made boats of the greater parts of this tree, and except- CH. XIX.
ing Noah's Ark, the first vessels we read of were made of this material.

Tunc alnos primùm fluvii fensère cavatas. GEORG. i.

When hollow Alders first the waters try'd.

Nec non & torrentem undam levis innatat alnus
Missa Pado ————— GEORG. ii.

And down the rapid Po light Alders glide.

And as then, so now are over-grown Alders frequently sought after for such buildings as lie continually under water, where it will harden like a very stone; whereas being kept in any unconstant temper, it rots immediately, because its natural humidity is of so near affinity with its adventitious, as Scaliger assigns the cause. Vitruvius tells us, that the morasses about Ravenna in Italy were piled with this timber to superstruct upon, and highly commends it. I find also they used it under that famous bridge at Venice, the Rialto, which passes over the Grand Canal, bearing a vast weight. Jos. Bauhinus pretends, that in tract of time it turns to stone; which perhaps it may seem to be, as well as other aquaticks, where it meets with some lapidescent quality in the earth and water.

5. The poles of Alder are as useful as those of Willows; but the coals far exceed them, especially for gunpowder. The wood is likewise useful for piles, pumps, hop-poles, water-pipes, troughs, sluices, small trays and trenchers, woodenheels; the bark is precious to dyers, and some tanners and leather-dressers make use of it; and with it and the fruit, instead of

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freedom in its luxuriant state. I have seen them as late as December, which gives the tree the appearance of an evergreen.

From the experience of ages the Alder is found to resist all impressions made upon it by water, which single consideration ought to induce us to increase our plantations of this tree. In Flanders, and in Holland, it is raised in abundance for the purposes of making piles for the support of buildings erected in moist and boggy situations. — The Alder produces a kind of cone which contains the seeds; but I do not find that these trees are raised with us otherwise than by layers or truncheons. The method of raising them by seeds, as practised abroad, is greatly to be commended.

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galls, -they compose an-ink. The fresh leaves alone applied to the naked sole of the foot, infinitely refresh the surbated traveller. The bark macerated in water, with a little rust of iron, makes a black dye, which may also be used for ink: The interior rind of the Black Alder purges all hydropic and serous humours; but it must be dried in the shade, and not used green, and the decoction, suffered to settle two or three days before it be drunk.

Being beaten with vinegar, it heals the itch certainly: As to other uses, the swelling bunches, which are now and then found in the old trees, afford the inlayer pieces curiously cambletted, and very hard; but the fagots are better for the fire than for the draining of grounds by placing them (as the guise is) in the trenches; which old rubbish of flint, stones, and the like gross materials, does infinitely exceed, because it is for ever, preserves the drains hollow, and being a little moulded over, will produce good grafs, without any detriment to the ground; but this is a secret not yet well understood, and would merit an exprefs paragraph, were it here seasonable.

— & jam nos inter opacas.

Musa vocat Salices



The Willow or Osier Tree?

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J. Miller del. et sc.

CHAP. XX.

The WITHEY, SALLOW, OZIER, and WILLOW *.

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1. **SALIX**, the Willow. Since Cato has attributed the third place to the *Salicetum*, preferring it even next to the very Ortyard, and (what one would wonder at) before even the Olive, Meadow, or Corn-field itself, I have thought good to be the more particular in my discourse upon it; especially, since so much of that which I shall publish concerning Willows is derived from the long experience of a most learned and ingenious person, from whom I acknowledge to have received many of these hints. Not to perplex the reader with the various names, Greek, Gallic, Sabin, Amerine, Vitex, &c. better distinguished by their growth and bark, and by Latin authors all comprehended under that of *Salices*; our English books reckon them promiscuously thus: The Common White Willow, the Black, and the Hard Black, the Rose of Cambridge, the Black Withy, the Round-long Sallow, the Longest Sallow, the Crack Willow, the Round-eared shining Willow, the lesser Broad-leaved Willow, Silver Sallow up-

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* There are several species of this genus which grow naturally in the northern parts of Europe, of little or no use, being low shrubs, many of them not a foot in height—so are never cultivated; therefore I shall pass them over, and only enumerate those which are planted for use.—The species are,

1. **SALIX** (*Alba*) foliis lanceolatis acuminatis serratis utrinque pubescentibus, ferraturis infimis glandulosis. Hort. Cliff. 473. *Willow with spear-shaped, acute-pointed, sawed leaves, which are downy on both sides, and glands below the saws.* *Salix vulgaris* alba, arborefcens. C. B. P. 453. *Common White Willow.*

This is the common White Willow, which is frequently found growing on the sides of rivers and ditches in many parts of England. It grows to a large size, if the branches are not lopped off; the shoots are covered with a smooth, pale, green bark; the leaves are spear-shaped, between three and four inches long, and one broad in the middle, drawing to a point at each end; they are very white on their under side, and their upper side is covered with short, white, woolly hairs, tho' not so closely as the under; the catkins are short and pretty thick. The wood of this sort is very white, and polishes smooth.

2. **SALIX** (*Triandra*) foliis ferratis glabris, floribus triandris. Lin. Sp. Plant. 1442. *Willow with smooth sawed leaves, and flowers having three stamina.* *Salix*, folio auri-

BOOK I. right broad Willow, Repent broad-leaved, the Redstone, the Lesser Willow, the Strait Dwarf, the Yellow Dwarf, the Long-leaved Yellow Salow, the Creeper, the Black low Willow, the Willow-bay, and the Ozier. I begin with the Withy.

WITHY. 2. The Withy is a reasonably large tree, (for some have been found ten feet about) and is fit to be planted on high banks, and ditch sides within reach of water, and the weeping sides of hills, because it extends its roots deeper than either Sallows or Willows. For this reason you should plant them at ten or twenty feet distance; and though they grow the slowest of all the twiggy trees, yet do they recompense it with the larger crop, the wood being tough, and the twigs fit to bind strongly; the very peelings of the branches being useful to bind arbor-poling, and in topiary-works, vineyards, espalier-fruit, and the like: And we are told of some that have

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culato splendente, flexilis. Raii Hist. 1420. Willow with lucid eared leaves and flexible branches.

This sort grows to be a large tree; the young branches are covered with a grayish bark; the leaves are smooth, and of a lucid green, ending in acute points; they are eared at their base, and sawed on their edges, and are green on both sides; the branches grow pretty erect and are flexible. This is frequently planted in Ozier grounds for the basket-maker. The catkins are long and narrow, and the scales are open and acute-pointed.

3. *SALIX (Pentandra) foliis ferratis glabris, flosculis pentandris. Hort. Cliff. 454. Willow with smooth sawed leaves, and flowers having five stamina. Salix folio laureo, seu lato glabro odorato. Raii Hist. 1420. Willow with a Bay-leaf, or broad-leaved, smooth, sweet-scented Willow.*

This has thick strong shoots covered with a dark green bark; the leaves are broad, and rounded at both ends; they are very smooth, sawed on their edges, and when rubbed have a grateful smell. It is called the Bay-leaved Willow, and sometimes the Sweet Willow; it grows quick, and is a tree of middling size. The branches are brittle, which makes them improper for many purposes.

4. *SALIX (Vitellina) foliis ferratis ovatis acutis glabris, ferraturis cartilagineis, petiolis calloso punctatis. Hort. Upsal. 295. Willow with smooth, oval, acute, sawed leaves, having cartilaginous indentures, and foot-stalks with callous punctures. Salix fativa lutea, folio crenato. C.B.P. 473. Yellow cultivated Willow with a crenated leaf.*

This sort has slender tough shoots, which are of a yellow colour; the leaves are oval, acute-pointed, smooth, and sawed on their edges; the saws are cartilaginous,

been twisted into ropes of an hundred and twenty paces, serving instead of cables. There are two principal sorts of these Withies, the Hoary, and the Red Withy, which is the Greek; toughest, and fittest to bind, whilst the twigs are flexible and tender.

3. Sallows grow much faster, if they are planted within reach of water, SALLOW. or in a very moorish ground, or flat plain; and where the soil is, by reason of extraordinary moisture, unfit for arable or meadow; for in these cases it is an extraordinary improvement: In a word, where Birch and Alder will thrive. Before you plant them, it is found best to turn the ground with a spade, especially if you design them for a flat. We have three sorts of Sallows amongst us, (which is one more than the antients challenged, who name only the Black, and White which was their Nitelina) the Vulgar Round-leaved, which proves best in drier banks, and the

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and the foot-stalks of the leaves have callous punctures. This is very pliable, so is much planted in the Ozier grounds for the basket-makers, but it never grows to a large size.

5. *SALIX (Amygdalina)* foliis serratis glabris lanceolatis petiolatis, stipulis trapeziformibus. Flor. Leyd. Prod. 83. *Willow with smooth, spear-shaped, sawed leaves, having foot-stalks, and trapezium-shaped stipules.* *Salix folio amygdalino, utrinque virente aurito.* C. B. P. 43. *Almond-leaved Willow with leaves which are eared, and green on both sides.*

This is a Willow of the middle size, sending forth numerous, flexible, tough branches, covered with a light-green bark. The leaves are spear-shaped, smooth, serrated, acute, eared at their base, and of a light-green colour on both sides. The flowers are oblong catkins, which turn to a light down in the summer.— There are several sorts of this species, which are of inferior value to this, which is generally distinguished from the others by the name of the Old Almond-leaved Willow. The branches are very tough and flexible, and when planted in the Ozier way, and grown one year from the stools, are very strong, and highly serviceable for the different purposes of basket-making.

6. *SALIX (Fragilis)* foliis serratis glabris ovato-lanceolatis, petiolis dentato-glandulosis. Flor. Lapp. 349. *Willow with oval, spear-shaped, smooth, sawed leaves, and indented glandules to the foot-stalk.* *Salix, folio longo latoque splendente, fragilis.* Raii Syn. 3. p. 448. *The Crack Willow.*

This grows to a middling size; the shoots are covered with a brownish bark, and very brittle, so are unfit for the basket-makers. The leaves are near five inches long and one broad, are of a lucid green on both sides, and sawed on their edges;

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Hopping Sallows, which require a moister soil, growing with incredible celerity; and a third kind, of a different colour from the other two, having the twigs reddish, the leaf not so long, and of a more dusky green; more brittle whilst it is growing in twigs, and more tough when arrived to a competent size: All of them useful for the thatcher.

4. Of these, the Hopping Sallows are in greatest esteem, being of a clearer terse grain, and requiring a more succulent soil; best planted a foot deep, and a foot and a half above ground, (though some will allow but a foot) for then every branch will prove excellent for future settlings. After three years growth, being cropped the second and third, the first year's increase will be betwixt eight and twelve feet long generally; the third year's growth, strong enough to make rakes and pike-staves; and the fourth, for Mr. Blithe's trenching plow, and other like utensils of the husbandman.

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the catkins are long and slender, and the scales are pretty long, acute-pointed, and stand open. It is commonly called Crack Willow, from the branches being very brittle.

7. SALIX (*Purpurea*) foliis ferratis glabris lanceolatis, inferioribus oppositis. It. Scan. 252. Willow with smooth, spear-shaped, sawed leaves, the lower of which grow opposite. Salix folio longo subluteo non auriculata, viminibus rubris. Raii Syn. *The long-leaved Red Willow.*

This is a tree of middling size; the shoots are very pliable, and fit for the basket-makers, which recommends it for the Ozier grounds; they are of a reddish colour; the leaves are spear-shaped, smooth, and sawed on their edges; those on the lower part of the branches are placed opposite, but on the upper they are alternate, and are of a yellowish green.

8. SALIX (*Viminalis*) foliis subintegerrimis lanceolato-linearibus longissimis acutis subtus sericeis, ramis virgatis. Flor. Suec. 813. Willow with the longest, linear, spear-shaped, acute leaves, which are almost entire, and silky on their under side, and rod-like branches. Salix foliis angustis & longissimis crispis, subtus albicantibus. J. B. 1. p. 212. Willow with the longest, narrow, curled leaves, which are white on their under side, *The Ozier.*

This is the Ozier, a tree of low growth, though the shoots grow amazingly long and strong in one year from the stools. The leaves are spear-shaped, narrow, long, acute, almost entire, of a blueish green on their upper side and hoary underneath, and grow on very short foot-stalks. This is the most propagated of all the kinds for basket-making: It admits of several sorts of different value, but all are

5. If ye plant them at full height (as some do at four years growth, setting them five or six feet length, to avoid the biting of cattle) they will be less useful for straight staves, and for settlings, and make less speed in their growth; yet this also is a considerable improvement. CH. XX.

6. These would require to be planted at least five feet distance (some set them as much more) and in the quincunx order: If they affect the soil, the leaf will come large, half as broad as a man's hand, and of a more vivid green, always larger the first year than afterwards: Some plant them sloping, and cross-wise like a hedge; but this impedes their wonderful growth; and (though Pliny seems to commend it, teaching us how to excorticate some places of each set, for the sooner production of shoots) it is

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useful to the basket-maker.—The varieties usually go by the names of the Green Ozier, the Old Basket Ozier, Welsh Wicker, &c.

9. *SALIX (Rubra) foliis integris, glabris lineari lanceolatis acutis.* Hudf. Flor. Angl. 364. *Willow with linear, spear-shaped, smooth leaves.* *Salix minimè fragilis, foliis longissimis, utrinque viridibus, non ferratis.* D. Sherard. Raii Syn. 449. *The least brittle Willow, with very long leaves which are green on both sides, and not sawed.*

This sort having very pliant branches, is much planted in the Ozier grounds. The leaves are very long; they are spear-shaped and entire, and are green on both sides. It grows to a middling size, if planted in moist land.

10. *SALIX (Babylonica) foliis ferratis glabris lineari-lanceolatis, ramis pendulis.* Hort. Cliff. 454. *Willow with smooth, sawed, linear, spear-shaped leaves, and hanging branches.* *Salix Orientalis, flagellis deorsum pulchrè pendentibus.* Tourn. Cor. 41. *The Weeping Willow.*

The Weeping Willow of Babylon will grow to be a large tree; its branches being long, slender, and pendulous, makes it proper to be planted upon the banks of rivers, ponds, and over springs; the leaves, also, are long and narrow; and when any mist or dew falls, a drop of water is seen hanging at their extremities, which, together with their hanging branches, cause a most lugubrious appearance. Lovers garlands are said to have been made of a species of this Willow, the branches of which are very slender and pliable; and the plant itself has always been sought after for ornamental plantations, either to mix with others of the like growth in the largest quarters, or to be planted out singly over springs, or in large opens, for the peculiar variety occasioned by its mournful look.

11. *SALIX (Helix) foliis ferratis glabris lanceolato-linearibus, superioribus oppositis obliquis.* Flor. Leyd. Prod. 83. *Willow with linear, spear-shaped, smooth, sawed leaves,*

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but a deceitful fence, neither fit to keep out swine nor sheep; and being set too near, inclining to one another, they soon destroy each other.

7. The worst Sallows may be planted so near, yet as to be instead of stakes in a hedge, and then their tops will supply their dwarfishness; and, to prevent hedge-breakers, many do thus plant them, because they cannot easily be pulled up after once they have struck root.

8. If some be permitted to wear their tops five or six years, their palms will be very ample, and yield the first and most plentiful relief to bees, even before our apricots blossom. The Hopping Sallows open and yield their palms before other Sallows; and when they are blown (which is about

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the upper of which are placed obliquely opposite. Salix humilior, foliis angustis subcæruleis ex adverso binis. Raii Syn. 2. p. 297. *The yellow Dwarf, or Rose Willow.*

The Rose-Willow is of much lower growth than the former. The body of the tree is covered with a rough, yellow bark. The branches are upright, tough, and of a reddish colour. The leaves are spear-shaped, narrow, smooth, of a blueish green colour, and, towards the upper part of the branches, are nearly opposite to each other. The flowers come out from the sides of the branches, and numbers of them are joined together in a rose-like manner. They are of a greenish white colour, and have a singular and beautiful appearance.

12. SALIX (*Caprea*) foliis ovatis rugosis, subtus tomentosis, undatis supernè denticulatis. Flor. Leyd. Prod. 83. *Willow with oval rough leaves which are waved, woolly on their under side, and indented towards the top.* Salix latifolia rotunda. C. B. P. 474. *Broad round-leaved Willow, or Sallow.*

The Sallow is well known all over England, and delights in a dry rather than a moist soil. It is a tree rather below the middle growth. The branches are brittle, smooth, of a dark green colour, and their chief use is for hurdlewood and the fire; though the trunk, or old wood, is admirable for several uses in the turnery way. The leaves are oval, rough, waved, indented at the top, and woolly underneath. The catkins are very large, white, appear early in the spring, and are much resorted to by the bees, on their first coming out of their hives at that early season. — There is a variety of this species with long leaves, which end in acute points; and another with smooth leaves, beautifully striped with white, called the Striped Sallow.

The Willow belongs to the class and order *Diœcia Diandria*, having male and female flowers on separate plants, and whose male flowers have two stamina. The flowers of that species called the Sallow make their appearance about the eleventh of March,

the exit of May, or sometimes June) the palms (or *ολεσινάρτοι*, Frugiperdæ, as Homer terms them, for their extreme levity) are four inches long, and full of a fine lanuginous cotton. Of this sort, there is a *Salix* near Darking in Surry, in which the *Julus* bears a thick cottonous substance: A poor body might in an hour's space gather a pound or two of it, which resembling the finest silk, might doubtless be converted to some profitable use by an ingenious housewife, if gathered in calm evenings, before the wind, rain, and dew impair them: I am of opinion, if it were dried with care, it might be fit for cushions, and pillows of chastity, for such of old was the reputation of the shade of those trees.

9. Of these Hopping Sallows, after three years rooting, each plant will yield about a score of staves of full eight feet in length, and so following, for use, as we noted above: Compute then how many fair pike-staves,

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and the leaves are out by the seventh of April. The leaves of the Weeping Willow are to be seen about the first of that month; and the buds of the White Willow will be swelled by the tenth of April; and by the eighteenth the leaves will be quite out, and the flowers full blown. The catkins of the Sallow are formed about the fifth of October.

The Willow, Sallow, and Ozier being quick-growing trees, they naturally invite the attention of such Gentlemen as have lands suitable to their cultivation; and indeed the immediate profit that they yield makes them a desirable object of attention. In order to raise a bed of Oziers the ground should be dug over, or plowed; the latter of which is not so beneficial as the former, though least expensive: The cuttings must then be procured; and although they should consist chiefly of the true Ozier kinds, yet other sorts must be introduced into this Ozier bed, to make it complete, and more useful to the basket-maker, who will want the different sorts for the different purposes in his trade. Besides the true Ozier, of which the plantation is chiefly to consist, there must be the Sallow, the long-shooting Green Willow, the Crane Willow, the Golden Willow, the Silver Willow, the Welsh Wicker, &c. by which names they are best known.

The cuttings should be of two-years wood, though the bottom parts of the strongest one-year shoots may do. They ought to be two feet and a half long, a foot and a half of which should be thrust into the ground, and the other foot remain for the stool. These cuttings should be put in at two feet two inches distance each way; and all the summer following the weeds must be kept under; the summer after that also the tallest of the weeds should be hacked down. The Willows must continue growing for three years, when they should be all cut down to the first-planted head. They will sell well to the hurdle-makers; and there will be a regular quantity of proper stools left, to exhibit an annual crop of twigs which will be worth five or six pounds, or more, per acre, to be sold to the basket-makers. But the price of the twigs is greater or less, in pro-

BOOK I. perches, and other useful materials, that will amount to in an acre, if planted at five feet interval; but a fat and moist soil requires indeed more space than a lean or drier, namely, six or eight feet distance.

10. You may plant settlings of the very first year's growth; but the second year they are better, and the third year better than the second, and the fourth as good as the third, especially if they approach the water. A bank, at a foot distance from the water, is kinder for them than a bog, or to be altogether immerfed in the water.

11. It is good to new-mould them about the roots every second or third year, but men seldom take the pains. It seems that Sallows are more hardy than even Willows and Oziers, of which Columella takes as much care as of Vines themselves. But it is cheaper to supply the vacancy of such accidental decays by a new plantation, than to be at the charge of

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portion to the nature of the situation. Watery ground, by the sides of navigable rivers, planted in this manner, will produce a greater price per acre, because near such places there generally reside numbers of basket-makers, who, having the conveniency of water-carriage, can send their twigs with more ease to distant places.

Plantations of these kinds may not only be regularly made to great advantage on watery land, by the sides of rivers, but the very islands, or any part where there is mud or earth, may be planted this way, to the great profit of the proprietors, which would otherwise produce nothing. And here suffer me to give one caution in the planting of these places: Let the rows, which should always run the same way with the stream, be at a greater distance from each other, and the cuttings proportionably closer in the rows. I advise the distance of the rows to be greater in these places, that the floods may have free liberty to carry off the sludge, which would otherwise be detained to the prejudice of the sets. Plantations of Willows to be cut down every six or seven years for poles, should be raised in the same manner, remembering that the sets should be placed at a greater distance, viz. one yard; but when designed for hurdles, to be cut every second or third year, the distance need not be so great.

In order to raise a *Salicetum*, or a plantation of Willows for timber, the ground must be dug or plowed; and the cuttings for this purpose should be of the last year's shoot. They ought to be a foot and a half long, and a foot of each should be thrust into the ground, at the distance of three feet each way. The latter end of May, or the beginning of June, the plantation should be looked over; when such sets as have shot out too luxuriant should have all the branches removed, except the strongest leading shoot. All this summer and the next the weeds must be kept down; afterwards, the trees will demand no farther care till the time of thinning, which will be in about five or six years. When the branches interfere with each other, the weakest tree should be

digging about them three times a year, as that author advises, seeing some of them will decay whatever care be used. CH. XX.

12. Sallows may also be propagated like Vines, by courbing and bowing them in arches, and covering some of their parts with mould, &c. also by cuttings and layers, and some years by the seeds likewise.

13. For settlings, those are to be preferred which grow nearest to the stock, and so (consequently) those worst which most approach the top. They should be planted in the first fair and pleasant weather in February, before they begin to bud; we about London begin at the latter end of December. They may be cut in spring for fuel, but best in autumn for use; but in this work (as of Poplar) leave a twig or two, which being twisted arch-wise, will produce plentiful sprouts, and suddenly furnish a head.

14. If in our copses every fourth set were a Sallow, amongst the rest of varieties, the profit would recompense the care; therefore where in woods

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grubbed up and taken away, to make room for the remainder. In five or six years more they will require a second thinning. In this manner they must be thinned as often as they touch one another, till the trees are arrived to their full maturity. By planting the cuttings a yard asunder at first, and afterwards thinning of them, they not only draw each other up, and by that means aspire to a great height, but the plants taken away to make room for the strongest will bring in a considerable profit when sold as poles.

The sorts used for plantations of these trees have hitherto been the common white and Red Willow. These, however, seem now to give place to other kinds which have been lately introduced.

Sets proper to be planted by the sides of ditches, &c. for pollards, should be nine feet in length, two feet and a half of which must be thrust into the ground, having first prepared the way by driving down a crow, or some such instrument, to prevent the bark, though the end be sharpened, from separating from the stem. After they are planted, they should be thorned from cattle; and in five or six years they will be fit for lopping; and thus may be continued to be lopped every fifth or sixth year, to the improvement of ditch-sides, water-gutters, &c. were it only for the fuel, as it emits little smoke, is remarkably sweet, burns pure and clear to the last, and is therefore proper for Ladies chambers, and such people as are curious in procuring the sweetest sorts of fire-wood.

Willows may be planted in the autumn, but the spring is the surest season. The planting however should not be delayed later than February, as the shoots of the succeeding year would not only be retarded, but the stools from whence they were taken greatly injured.

BOOK I. you grub up trees, thrust in truncheons of Sallows, or some aquatick kind. In a word, an acre or two furnished with this tree, would prove of great benefit to the planter.

15. The swift-growing Sallow is not so tough and hardy for some uses as the flower, which makes stocks for gardeners' spades; but the other is proper for rakes, pikes, mops, &c. Sallow-coal is the soonest consumed, but of all others the most easy and accommodate for painters scribbles to design their work and first sketches on paper with, &c. as being fine, and apt to split into pencils. Of the Sallow (as of the Lime-tree) is made the shoemaker's carving or cutting board, as best to preserve the edge of their knives, for its equal softness every way.

OZIER. 16. Oziers, or the aquatick and lesser Salix; are of innumerable kinds, commonly distinguished from Sallows, as Sallows are from Withies, being so much smaller than the Sallows, and shorter lived, and requiring more constant moisture, yet should be planted in rather a dryish ground, than over moist and spewing, which we frequently cut trenches to avert. It likewise yields more limber and flexible twigs for baskets, flasks, hampers, cages, lattices, cradles, &c. It is of excellent use for the bodies of coaches and waggons, being light, durable, and neat, as it may be wrought and covered. It is good for chairs, hurdles, staves, bands, the stronger for being contused and wreathed; likewise for fish-weirs, and to support the banks of impetuous rivers: In fine, for all wicker and twiggy works;

Viminibus Salices ————— VIRO.

17. But these sort of Oziers should be cut in the new shoot; for if they stand longer they become more inflexible: Cut them close to the head, a foot or so above earth, about the beginning of October, unless you will attend till the cold be past, which is better; and yet we about London cut them in the most piercing seasons, and plant them also till Candlemas, which those who do not observe, we judge ill husbands, as I learn from a very experienced basket-maker; and in the decrease, for the benefit of the workman, though not altogether for that of the stock, and succeeding shoot. When they are cut, make them up into bundles, and give them shelter; but such as are for white-work, as they call it, being thus fagotted and made up in bolts, as the term is, severing each sort by themselves, should be set in water, the ends dipped; and indeed all peeled wares of the viminious kind are not otherwise preserved from the worm; but for black

and unpeeled, shelter them under covert only, or in some vault or cellar, to keep them fresh, sprinkling them now and then in excessive hot weather: The peelings of the former are for the use of the gardener and cooper, or rather the splittings.

18. We have in England these three vulgar sorts; one of little worth, being brittle, and very much resembling the fore-mentioned Sallow, with reddish twigs, and more greenish and rounder leaves: Another kind there is, called Perch, of limber and green twigs, having a very slender leaf: The third sort is totally like the second, only the twigs are not altogether so green, but yellowish, and near the Popinjay: This is the very best for use, being tough and hardy. But the most usual names by which basket-makers call them about London, and which are all of different species, therefore to be planted separately, are, the Hard Gelster, the Horse Gelster, Whining or Shrivelled Gelster, the Black Gelster, with which Suffolk abounds. Then follow the Gollstones, the Hard and the Soft Gollstone (brittle and worst of all the Gollstones) the Sharp and Slender-topped Yellow Gollstone; the Fine Gollstone: Then is there the Yellow Ozier, the Green Ozier, the Snake, or Speckled Ozier, Swallow-tail, and the Spaniard: To these we may add (amongst the number of Oziers, for they are both governed and used alike) the Flanders Willow, which will arrive to be a large tree, as big as one's middle, the oftener cut the better; with these our coopers tie their hoops to keep them bent. Lastly, the White Sallow, which being of a year or two growth, is used for Green-work; and if of the toughest sort, to make quarter-can hoops, of which our seamen provide great quantities.

19. These choicer sorts of Oziers, which are ever the smallest, also the Golden Yellow and White, which is preferred for propagation and to breed of, should be planted of slips of two or three years growth, a foot deep, and half a yard in length, in moorish grounds or banks, or else in furrows; so that, as some direct, the roots may frequently reach the water, *Eluminibus Salices*—though we commonly find it rots them, and therefore never chuse to set them so deep as to scent it.

20. The season for planting is January, and all February, tho' some not till Mid-February, at two feet square; but cattle being excessively liquorish of their leaves and tender buds, some talk of grafting them out of reach upon Sallows, and by this to advance their sprouting; but as the work would consume time, so have I never seen it succeed.

BOOK I.

21. Some do also plant Oziers, in their *Eights*, like Quick-fets, thick, and (near the water) keep them not more than half a foot above ground; but then they must be diligently cleansed from moss, slab, and ouze, and frequently pruned, especially the smaller spires, to form single shoots; at least that few or none grow double; these they head every second year about September, the autumnal cuttings being best for use: But generally,

22. You may cut Withies, Sallows, and Willows at any mild and gentle season, between leaf and leaf, even in winter; but the most congruous time both to plant and to cut them is, *Crescente lunâ Vere, circa Calendas Martias*; that is, about the new moon, and first open weather of the early spring.

23. It is in France, upon the Loire, where these *Eights*, as we term them, and plantations of Oziers and Withies, are perfectly understood; and both there, and in divers other countries beyond seas, they raise them of seeds contained in their Juli, or Catkins, which they sow in furrows, or shallow trenches, and it springs up like corn in the blade, and comes to be so tender and delicate, that they frequently mow them with a scythe: This we have attempted in England too, even in the place where I live; but the obstinate and unmerciful weeds did so confound them, that it was impossible to keep them clean with any ordinary industry, and so they were given over: It seems, either weeds grow not so fast in other countries, or that the people, which I rather think, are more patient and laborious.

Note, That these Juli are not all of them seed-bearers; some are sterile, and whatever you raise of them will never come to bear; and therefore by some they are called the male sort, as Mr. Ray, that learned botanist, has observed. The Ozier is of that emolument, that in some places I have heard twenty pounds has been given for one acre; ten is in this part an usual price; and doubtless it is far preferable to the best corn-land, not only for that it needs but once planting, but because it yields a constant crop and revenue to the world's end; and is therefore, in esteem of knowing persons, valued in purchase accordingly; considered likewise how easily it is renewed, when a plant now and then fails, by but pricking in a twig of the next at hand, when you visit to cut them. We have in the parish near Greenwich, where I lately dwelt, improved land from less than one pound to near ten pounds the acre: And when we shall reflect upon the infinite quantities of them we yearly bring out of France and Flanders, to supply

the extraordinary expence of basket-work, &c. for the Fruiterers, Lime-burners, Gardeners, Coopers, Packers-up of all sorts of ware, and for general carriage, which seldom last above a journey or two, I greatly admire. Gentlemen do not more think of employing their moist grounds (especially where tides near fresh rivers are reciprocal) in planting and propagating Oziers. To omit nothing of the culture of this useful Ozier, Pliny would have the place to be prepared by trenching it a foot and a half deep, and in that to fix the sets, or cuttings, of the same length at six feet interval. These, if the sets be large, will come immediately to be trees; which after the first three years are to be abated within two feet of the ground; then in April he advises to dig about them. Some raise them abundantly, by laying poles of them in a boggy earth only: Of these they formerly made Vine-props, Juga, as Pliny calls them, for arch-wise bending and yoking, as it were, the branches to one another; and one acre hath been known to yield props sufficient to serve a Vineyard of twenty-five acres.

24. John Tradescant brought a small Ozier from St. Omers in Flanders, which makes incomparable net-works, not much inferior to the Indian twig, or bent-works, which we have seen; but if we had them in greater abundance, we should haply want the artificers who could employ them, and the dexterity to varnish so neatly.

25. Our common Salix, or Willow, is of two kinds, the White and the Black: The White is also of two sorts, the one of a yellowish, the other of a browner bark: The Black Willow is planted of stakes, of three years growth, taken from the head of an old tree, before it begins to sprout; set them of six feet high, and ten distant, as directed for the Poplar. Those woody sorts of Willow delight in meads and ditch-sides, rather dry than over wet (for they love not to wet their feet, and last the longer); yet the black sort, and the reddish, do sometimes well in more boggy grounds, and should be planted of stakes as big as one's leg, cut as the other at the length of five or six feet, or more into the earth; the hole made with an oaken stake and beetle, or with an iron crow, (some use a long auger) so as not to be forced in with too great violence: But first the truncheons should be a little sloped at both extremes, and the biggest planted downwards: To this, if they are soaked in water two or three days (after they have been sized for length, and the twigs cut off before you plant them) it will be the better. Let this be done in February, the mould as

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well closed to them as possible, and treated as was taught in the Poplars. If you plant for a kind of wood, or copse, for such I have seen, set them at six feet distance, or nearer, in the quincunx, and be careful to take away all suckers from them at three years end; you may abate the head half a foot from the trunk, viz. three or four of the lustiest shoots, and the rest cut close, and bare them yearly, that the three, four, or more you left may enjoy all the sap, and so those which were spared will be gallant pearches within two years. Arms of four years growth will yield substantial sets, to be planted at eight or ten feet distance, and for the first three years well defended from the cattle, who infinitely delight in their leaves, green or withered. Thus a Willow may continue twenty or five-and-twenty years, with good profit to the industrious planter, being headed every four or five years; some have been known to shoot no less than twelve feet in one year, after which the old rotten dotards may be felled, and easily supplied: But if you have ground fit for whole copses of this wood, cast it into double dikes, making every fofs near three feet wide, and two and a half in depth; then leaving four feet at least of ground for the earth (because in such plantations the moisture should be below the roots, that they may rather see than feel the water) and two tables of sets on each side, plant the ridges of these banks with but one single table, longer and bigger than the collateral, viz. three, four, five, or six feet high, and distant from each other about two yards. These banks being carefully kept weeded for the first two years, till the plants have vanquished the grass, and not cut till the third, you may then lop them traverse, and not obliquely, at one foot from the ground, or somewhat more, and they will head to admiration; but such which are cut at three feet height are most durable, as least soft and aquatick: They may also be grafted betwixt the bark, or budded; and then they become so beautiful as to be fit for some kind of delightful walks; and this I wish were practised among such as are seated in low and marshy places, not so friendly to other trees. Every acre, at eleven or twelve years growth, may yield you near an hundred load of wood: Cut them in the spring for dressing, but in the fall for timber and fuel. I have been informed that a Gentleman in Essex has lopped no less than two thousand yearly, all of his own planting. It is far the sweetest of all our English fuel, Ash not excepted, provided it be found and dry; and, emitting little smoak, is the fittest for Ladies chambers; and all those woods and twigs should be cut either to plant, work with, or burn in the driest time of the day.

To confirm what we have advanced in relation to the profit which may be made by this husbandry, see what comes to me from a worthy person whom we shall have occasion to mention, with great respect, in the chapter of Quicksets.

The considerable improvement which may be made in common fields as well as inclosed grounds, he demonstrates by a little spot of meadow of about a rod and half; part of which being planted, about fifty years since, with Willows, (in a clump not exceeding four poles in length, on one side about twelve) several of them at the first and second lopping, being left with a strait top, run up, like Elms, to thirty or forty feet in height; which some years since yielded boards of fourteen or fifteen inches broad, as good for flooring and other purposes within doors, as deals, last as long, work finer, white and beautiful: It is indeed a good while since they were planted, but it seems the crop answered his patience, when he cut up as many of them (the year 1700) as were well worth ten pounds; and since that another tree, for which, with those that were left, a joiner offered him as much, which was more by half than the whole ground itself was worth; so as having made twenty pounds of the spot, he still possesses it without much damage to the grass. The method of planting was first by making holes with an iron crow, and widening them with a stake of wood, fit to receive a lusty plant, and sometimes boring the ground with an auger; but neither of these succeeding, (by reason the earth could not be rammed so close to the sides and bottom of the sets as was requisite to keep them steady, and seclude the air, which would corrupt and kill the roots) he caused holes, or little pits, of a foot square and depth to be dug, and then making a hole with the crow in the bottom of the pits to receive the set, and breaking the turf which came out of it, rammed it in with the mould close to the sets (as they would do to fix a gate-post) with great care not to gall the bark of it. He had divers times before this miscarried, when he used formerly to set them in plain ground, without breaking the surface, and laying it close to the sets; and therefore, if the soil be moist, he digs a trench by the side of the row, and applies the mould which comes out of it about the sets; so that the edge of the bank, raised by it, may be somewhat higher than the earth next the set, for the better descent of the rain, and advantage of watering the sets in dry weather; preventing likewise their rooting in the bank, which they would do if the ground next the plant or set were made high, and sloped; and being left

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unfenced, cattle would tread down the bank, and lay the roots bare; the ground should therefore not be raised above two or three inches towards the body of the set. Now if the ground be dry, and want moisture, he chooses to bank them round, the fosses environing the mound and hillock, which being reserves for the rain, cools and refreshes the sets.

He farther instances, that Willows of about twenty years growth have been worth thirty shillings, and another fold for three pounds, which was well worth five pounds; and affirms, that the Willows planted in beds, between double ditches, in boggy ground, may be fit to be cut every five years, and pay as well as the best meadow-pasture; which is an extraordinary improvement.

26. There is a sort of Willow of a slender and long leaf, resembling the smaller Ozier, but rising to a tree as big as the Sallow, full of knots, and of a very brittle spray, only here rehearsed to acknowledge the variety.

27. There is likewise the Garden-Willow, which produces a sweet and beautiful flower, fit to be admitted into our hortulan ornaments, and may be set for partitions of squares; but they have no affinity with the others. There is also in Shropshire, another very odoriferous kind, extremely fit to be planted by pleasant rivulets, both for ornament and profit: It is propagated by cuttings or layers, and will grow in any dry bottom, so it be sheltered from the south, affording a wonderful and early relief to the industrious bee. Vitruvius commends the Vitex of the Latines (impertinently called Agnus Castus, the one being but the interpretation of the other) as fit for building; I suppose they had a sort of better stature than the shrub growing among the curious with us, and which is celebrated for its chaste effects, and for which the Antients employed it in the rites of Ceres: I rather think it more convenient for the sculptor, which he likewise mentions, provided we may, with safety, restore the text, as Perrault has attempted, by substituting Levitatem for the author's Rigiditatem, stubborn materials being not so fit for that curious art.

28. What most of the former enumerated kinds differ from the Sallows, is indeed not much considerable, they being generally useful for the same purposes; as for boxes, such as apothecaries and goldsmiths use; for cart saddle-trees, yea gun-stocks and half-pikes; harrows, shoemakers lafts, heels, clogs for pattens; forks, rakes, especially the teeth, which should be

wedged with Oak; but let them not be cut for this when the sap is stirring, because they will shrink; for pearches, rafters for hovels, portable and light ladders, hop-poles, ricing of kidney-beans, and supporters to Vines, when our English vineyards come more in request: Also for hurdles, sieves, lattices; for the turner, kyele-pins, great town-tops; for platters, little casks and vessels, especially to preserve verjuices in, the best of any. Pales are made of cleft Willow; also dorsers, fruit-baskets, cans, hives for bees, trenchers, trays, &c. and for polishing and whetting table-knives the butler will find it above any wood or whetstone; it makes coals, bavin, and excellent firing, not forgetting the fresh boughs, which, of all the trees in nature, yield the most chaste and coolest shade in the hottest season of the day; and this umbrage so wholesome, that physicians prescribe it to feverish persons, permitting them to be placed even about their beds, as a safe and comfortable refrigerium. The wood being preserved dry, will dure a very long time*; but that which is found wholly putrefied, and reduced to a loamy earth in the hollow trunks of superannuated trees, is, of all other, the fittest to be mingled with fine mould, for the raising our choicest flowers, such as Anemonies, Ranunculuses, Auriculas, and the like.

Quid majora sequar? Salices, humilesque genistæ,
Aut illæ pecori frondem, aut pastoribus umbram
Sufficiunt, sepemque satis & pabula melli.

GEORG. II.

What would we more? Low Broom, and Sallows wild,
Or feed the flock, or shepherd's shade, or field
Hedges about, or do us honey yield.

29. Now by all these plantations of the aquatick trees, it is evident the Lords of moorish commons and unprofitable wastes may learn some improvement, and the neighbour bees be gratified, and many tools of husbandry become much cheaper. I conclude with the learned Stephanus's note upon these kind of trees, after he has enumerated the universal benefit of the Salicium: *Nullius enim tutior redditus, minorisve impendii, aut tempestatis securior.*

N O T E S.

* Willows, and all the soft woods, when used for poles or other purposes, should be stripped of their bark and steeped in water for some months, which will prevent the worm, and render the wood extremely durable.

DENDROLOGIA.

BOOK THE SECOND.

CHAP. I.

The FIR, PINE, PINASTER, PITCH-TREE, LARCH,
AND SUBTERRANEAN TREES. *

Book II. 1. **A**BIES, *Picea*, *Pinus*, *Pinafter*, *Larch*, &c. are all of them easily raised of the kernels and nuts, which may be gotten out of their polysperm and turbinate cones, clogs, and squams, by exposing them to the sun, or a little before the fire, or in warm water, till they begin to gape, and are ready to deliver themselves of their numerous burdens.

FIR.

2. There are of the Fir two principal species; the *Picea*, or Male, which is the bigger tree, very beautiful and aspiring, and of an harder wood, and hirsute leaf; and the Silver Fir, or Female. I begin with the first: The boughs whereof are flexible and bending; the cones dependent, long and smooth, growing from the top of the branch; and where gaping, yet retain the seeds in their receptacles, when fresh gathered, giving a grateful fragrantcy of the rosin: The fruit is ripe in September. But after all, for a perfecter account, the true and genuine Fir-tree is a noble up-

NOTES.

* Of this genus of plants there are various species

1. *PINUS (Sylvestris) foliis geminis; primordialibus solitariis glabris.* Hort. Cliff. 450. *Pine-tree with two leaves in each sheath, but the first leaves are single.* *Pinus Sylvestris* C. B. P. 491. *The Wild Pine, or Scotch Fir-tree.*

This is called by us the Scotch Fir, because it grows naturally on the Highlands of Scotland, where the seeds, falling from their cones, come up and propagate themselves without any care. But it is not in Scotland only that these trees thrive naturally; for they grow spontaneously in Denmark, Norway, and Sweden. And though, from the above instances, it would seem that they delighted princi-



The Scotch Fir Tree.

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J. Miller del. & sc.



right tree from the ground, smooth and even to the eruption of the branches, which they call the Sapinum, and thence tapering to the summit of the Fusterna: The arms and branches, with Yew-like leaves, grow from the stem opposite to one another, seriatim to the top, as do all cone-bearers, discovering their age; which in time, with their weight, bend them from their natural tendency, which is upright, especially toward the top of aged trees, where the leaf is flattish, and not so regular; the cone great and hard, pyramidal, and full of winged seeds.

The Silver Fir, of a whitish colour, like Rosemary, under the leaf, is distinguished from the rest by the pectinal shape of it: The cones not so large as the Picea, grow also upright, and this they call the Female: For

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pally in these northern parts; yet when the plants are properly raised and planted out, no climate comes amiss to them, for they will thrive and grow to be good timber-trees in almost any part of the world.—The timber of this tree is what we call Deal, which is sometimes red, sometimes yellow, but chiefly white. For the manner of collecting the seeds and sowing them, see p. 51.

2. PINUS (*Strobus*) foliis quinis margine scabris; cortice lævi. Gron Virg. 152. Pinus Canadensis quinquefolia, floribus albis, conis oblongis pendulis, squamis abieti fere similibus. Duham. Arb. 2. p. 127. Pinus Virginiana, conis longis non ut in vulgari echinatis. Pluk. Alm. 297. *The Weymouth Pine.*

This grows naturally in most parts of North-America, where it is called the White Pine. It is one of the tallest trees of all the species, often growing a hundred feet high in those countries, as I have been credibly informed. The bark of this tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of each sheath; the branches are pretty closely garnished with them, so make a fine appearance; the cones are long, slender, and very loose, opening with the first warmth of the spring, so that if they are not gathered in winter, the scales open and let out the seeds. The wood of this sort is esteemed for making masts for ships; it is in England titled Lord Weymouth's, or New-England Pine. As the wood of this tree was generally thought of great service to the navy, there was a law made in the ninth year of Queen Ann for the preservation of the trees, and to encourage their growth in America; and it is within these forty years that these trees began to be propagated in England in any plenty, though there were some large trees of this sort growing in two or three places long before, particularly at Lord Weymouth's, and Sir Wyndham Knatchbull's in Kent; and it has been chiefly from the seeds of the latter that the much greater number of these trees now in England have been raised; for although there has annually been some of the seeds brought from America, yet

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I find botanists not unanimously agreed about the sexes of trees. The layers, and even cuttings of this tree, take root, and improve to trees, though more naturally by its winged seeds: But the masculine Picea will endure no amputation, nor is comparable to the Silver Fir for beauty, or so fit to adorn walks and avenues. Tho' the other also be a very stately plant, yet it has this infirmity, that tho' it remain always green, it sheds the old leaves more visibly, and not seldom breaks down its ponderous branches: Besides, the timber is nothing so white; though yet even that colour be not always the best character: That which comes from Bergen, Swinfund, Mott, Longland, Dranton, &c. (which experienced workmen call the Dram) being long, strait, and clear, of a yellow and more cedary colour, is esteemed much before the White for flooring and wainscot, for

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these have been few in comparison to the produce of the trees in Kent; and many of the trees which have been raised from the seeds of those now produce plenty of good seeds, particularly the trees in the gardens of his Grace the Duke of Argyle at Whitton, which annually produce large quantities of cones.—This sort and the Scotch Pine are the best worth cultivating of all the kinds for the sake of their wood; the others may be planted for variety in parks, &c. where they make a good appearance in winter, when other trees are destitute of leaves.

3. PINUS (*Pinea*) foliis geminis; primordialibus solitariis ciliatis. *Pine-tree with two gray leaves coming out of each sheath, and the first leaves single.* Pinus fativa. C. B. P. 490. *The cultivated Pine-tree, commonly called the Stone Pine.*

The Stone Pine is a tree of which there should be a few in all plantations of ever-greens. It will grow to a considerable height, and arises with a straight and fair stem, though with a rough bark. The leaves will contribute to the diversifying of the scene, as they differ in colour from the other sorts, and are arranged in a different manner. The cones which it bears are monstrously large and turbinated; they strike the eye by their bold appearance when hanging on the trees, and afford pleasure upon being more closely examined, from the beautiful arrangement of their scales. They produce a large kernel as sweet to the taste as an Almond, which formerly were kept in the shops, and sold for restoratives, but are at present neglected.—This tree is a native of Italy, where the kernels are served up in desserts at the table; they are thought to be salutary in colds, coughs, and consumptions.—The Stone Pine may be sawed into good boards, though the timber is generally allowed not to be quite so valuable as the other sorts. The colour is not the same in all trees; some exhibiting their timber of a very white colour, others again are yellower, and smell stronger of the turpentine.

4. PINUS (*Tæda*) foliis longioribus tenuioribus ternis, conis maximis laxis. *Pine-tree with three longer narrower leaves, and the largest loose cones.* Pinus Virginiana

maſts, &c. thoſe of Pruſſia, which we call Spruce, and Norway, eſpecially from Gottenberg, and about Riga, are the beſt; unleſs we had more commerce of them from our plantations in New-England, which are preferable to any of them; there lying rotting at preſent at Paſcataway a maſt of ſuch prodigious dimenſions, as nobody will adventure to ſhip and bring away. All theſe bear their ſeeds in conic figures, after an admirable manner and cloſeneſs, to protect their winged ſeeds.

The Hemlock-tree, as they call it in New-England, is a kind of Spruce. In the Scottiſh Highlands are trees of wonderful altitude (though not altogether ſo tall, thick, and fine as the former) which grow upon places ſo

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tenuifolia tripilis, ſc. *ternis plerumque ex uno folliculo ſetis, ſtrobilis majoribus*. Pluk. Alm. 297. *Virginian Pine-tree with three narrow leaves in each ſheath, and larger cones. The Swamp Pine-tree.*

This is a very large growing tree, and is highly proper, as its name imports, to be planted in moiſt places.—The leaves are long, of a delightful green colour; three iſſue out of each ſheath, and adorn the younger branches in great plenty.—Its propagation is the ſame as the Weymouth Pine; and the planting out, and after-management of the trees, ſhould be exactly ſimilar.—It will grow well on all upland and dry grounds; but it chiefly delights in moiſt places.

5. *PINUS (Cembra) foliis quinis lævibus*. It. Scan. 32. *Laryx ſempervirens, foliis quinis, nucleis edulebus*. Breyn. E. N. C. Cent. 7. Obf. 2. *The Cembra Pine.*

The Cembra Pine is a fine tree; the leaves are very beautiful, being of a lighter green than moſt of the ſorts, and are produced five in a ſheath. They are long and narrow; and as they cloſely ornament the branches all round, they look beautiful, and render the tree on that account very valuable. The cones of this tree alſo have a good effect; for they are larger than thoſe of the Pineafter, and the ſquamæ are beautifully arranged.—This tree is a native of the Alps, and is well deſcribed by Mr. Harte, in his elegant Eſſays on Huſbandry, under the title of *Aphernouſſi Pine*. He conſiders it as a tree likely to thrive with great advantage on our bleak, barren, rocky, and mountainous lands; even near the ſea, and in north or north-eaſterly aſpects, where ſomething of this hardy kind is much wanted. The timber is large and has many uſes, eſpecially within doors, or under cover. The bark of the trunk or bole of the tree is not reddiſh like the bark of the Pine, but of a whitiſh caſt, like that of the Fir. The ſhell which incloſes the kernel is eaſily cracked, and the kernels are covered with a brown ſkin which peels off. They are about the ſize of a common pea, triangular like buck-wheat, and white and ſoft as a blanched almond, of an oily agreeable taſte, but leaving in the mouth *that* ſmall degree of aſperity which is peculiar to wild fruits, and not unpleaſing. Theſe kernels ſometimes make a part in a Swiſs de-

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inaccessible, and far from the sea, that, as one says, they seem to be planted by God on purpose for nurseries of seed, and monitors to our industry, reserved with other blessings, to be discovered in our days amongst the new-invented improvements of husbandry, not known to our southern people of this nation. Did we consider the pains they take to bring them out of the Alps, we should less stick at the difficulty of transporting them from the utmost parts of Scotland. To the former sorts we may add the Esterund Firs, Tonsberry, Frederickstadt, Hellerone, Holmstrand, Landifer, Stravenger, Lawrwat, &c. There is likewise a kind of Fir called in Dutch the Green-boome, much used in building of ships, though not for men of war, because of its lightness, and that it is not so strong as

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fert. Waincotting, flooring, and other joiners work, made with the planks of Apheroufli, are of a finer grain, and more beautifully variegated than deal, and the smell of the wood is more agreeable. From this tree is extracted a white odoriferous resin. On this occasion the curious planter may consult a very scarce piece, *De Arboribus Coniferis*, written about 200 years ago, by Pietro Belloni.—In the plantations belonging to Jeremiah Dixon, Esq; at Gledhow near Leeds, may be seen several of these Pines. They are there called the Gledhow Pine.

6. PINUS (*Picea*) foliis solitariis emarginatis. Lin. Sp. Pl. 1420. *Abies taxi* folio, fructu sursum spectante. Tourn. Inst. 585. *Abies conis* sursum spectantibus. f. maf. Bauh. Pin. 505. *The Silver Fir-tree*.

This is a noble upright tree. The branches are not very numerous, and the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green colour, and their under has an ornament of two white lines, running lengthways on each side the midrib, on account of which silvery look this sort is called the Silver Fir. The cones are large, and grow erect; and when the warm weather comes on, they soon shed their seeds; which should be a caution to gather the cones before that happens—This tree is common in the mountainous parts of Scotland, and in Norway, and affords the yellow deals. From its yielding pitch, it has obtained the title of *Picea*, or Pitch-tree.

7. PINUS (*Abies*) foliis solitariis subulatis mucronatis lævibus bifariam versis. Lin. Sp. Pl. 1421. *Abies* foliis solitariis apice acuminatis. Hort. Cliff. 445. *The common Spruce Fir-tree*.

The Spruce Fir is a beautiful tree, as well as a valuable one for its timber, producing the white deal. It is a native of Norway and Denmark, where it grows spontaneously, and is one of the principal productions of their woods. It also grows plentifully in the Highlands of Scotland, where it adorns those cloud-capped mountains with a constant verdure. The long-coned Cornish Fir is a variety of



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The Spruce Fir Tree.
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J. Miller del. &c.

Oak; but yet proper enough for vessels of great burden, which stand much out of the water: This sort comes into Holland from Norway, and other Eastland countries; it is somewhat heavier yet than Fir, and stronger, nor do either of them bend sufficiently. As to the seeds, they may be sown in beds or cases at any time during March; and when they peep, carefully defended with Furzes, or the like fence, from the rapacious birds, which are very apt to pull them up, by taking hold of that little infecund part of the seed, which they commonly bear upon their tops: The beds wherein you sow them had need be sheltered from the southern aspects, with some skreen of reed, or thick hedge: Sow them in shallow rills, not above half an inch deep, and cover them with fine light mould;

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this tree, and differs scarcely in any respect, except that the leaves and the cones are larger. As Gardeners generally receive it as a distinct Fir, I thought it not amiss to mention it here; though I must own the difference is so inconsiderable as to make it hardly worth seeking after; and though the cones are rather longer than the other sort, yet of that also the cones are very large, oftentimes near a foot; so that they may easily pass the one for the other, as they both hang down alike. The varieties of the Norway Spruce go by the names of *Picea major prima*, five *Abies rubra*: *Abies alba*, five *femina*, & *Abies minor*.

8. *PINUS (Cedrus) foliis fasciculatis acutis*. Hort. Cliff. 449. *Cedrus Conifera*, foliis *Laricis*. B. P. 450. *Cedrus Libani*. Barr. Ic. 499. *The Cedar of Lebanon*.

This tree is now classed with the Pine; but as Mr. Evelyn has a separate chapter upon it, I shall, in this place, only give its botanical description.

9. *PINUS (Larix) foliis fasciculatis obtusis*. Lin. Sp. Pl. 1420. *Larix*, folio deciduo, conifera. B. P. 1. p. 263. *The Larch-tree*.

This tree is of quick growth, and will rise to the height of fifty feet; the branches are slender, and their ends generally hang downward. These are garnished with long narrow leaves, which arise in clusters from one point, and spread open above like the hairs of a painter's brush; they are of a light green, and fall away in autumn like other deciduous trees. In the month of April the male flowers appear, which are disposed in form of small cones; the female flowers are collected into oval obtuse cones, which in some species have bright purple tops, and in others they are white: these differences are accidental, for I have found the seeds taken from either of these varieties, will produce plants of both sorts; the cones are about one inch long, obtuse at their points, and the scales lie over each other, and are smooth; under each scale there is generally lodged two seeds which have wings.—The Larch is a native of the Alps and Appenine mountains, and is now very common in all the nurseries of this kingdom. It is remarked that those

Book II. being risen a finger in height, establish their weak stalks by sifting some more earth about them, especially the Pines, which being more top-heavy, are more apt to swag. When they are of two or three years growth, you may transplant them where you please; and when they have gotten good root, they will make prodigious shoots, but not for the three or four first years comparatively. They will grow both in moist and barren gravel and poor ground, so it be not over sandy and light, and want a loamy ligature; but before sowing (I mean here for large designs) turn it up a foot deep, sowing or setting your seeds an hand distance, and riddle earth upon them; in five or six weeks they will peep. When you transplant, water them well before, and cut the clod out about the root, as you do melons.

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trees which have been planted in the worst soils, and most exposed situations, have thriven the best, which is a great encouragement. Some trees cannot bear too great a luxuriancy, and this tree in particular is apt to grow top-heavy from too much shelter and nourishment. These trees, when planted, should be put into clumps, and not as single trees; neither should the plants be taken from very warm nurseries, if intended to be placed out upon exposed situations, but rather raised as near the spot as possible, taking care that the soil be good. When they are intended to grow large, they should not exceed three or four years when planted; for though trees of a greater size will remove very well, yet experience has shewn us that the youngest trees, with good roots, bear the change of situation the best. The Larch is a tree as yet but little known in this kingdom; but there is great reason to apprehend that it will prove a very important acquisition to the planter. In Switzerland they cover the roofs of their houses with shingles made of Larch. These are generally cut about one foot square, and half an inch in thickness, which they nail to the rafters. At first the roof appears white, but in two or three years it becomes as black as coal, and all the joints are stopped by the resin which the sun extracts from the pores of the wood. This shining varnish renders the roof impenetrable to wind or rain. It makes a cheap covering, and, as some say, an incombustible one; but this is rather doubtful.—From this tree is extracted what we erroneously call *Venice Turpentine*. This substance, or natural balsam, flows, at first, without incision; when it has done dropping, the poor people, who wait in the Fir-woods, make incisions, at about two or three feet from the ground, into the trunk of the trees, and into these they fix narrow troughs, about twenty inches long. The end of these troughs is hollowed, like a ladle; and in the middle is a small hole bored, for the turpentine to run into a receiver, which is placed below it. As the gummy substance runs from the trees, it passes along the sloping gutter, or trough, to the ladle, and from thence runs through the holes into the receiver. The people who gather it visit the trees morning and evening, from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, the tur-



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out of the hot-bed, which knead close to them like an egg: Thus they may be sent safely many miles, but the top must neither be bruised, nor much left cut, which would dwarf it for ever: One kind also will take of slips or layers, interred about the latter end of August, and kept moist. CHAP. I.

3. The best time to transplant, were in the beginning of April; they will thrive mainly in a stiff, hungry clay, or rather loam; but by no means in over light, or rich soil: Fill the holes therefore with such barren earth, if your ground be improper of itself; and if the clay be too stiff and untractable, with a little sand, removing them with as much earth about the roots as is possible, though the Fir will better endure a naked trans-

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pentine is clear, like water, and of a yellowish white; but, as it grows older, it thickens, and becomes of a citron colour. It is procured in greatest abundance in the neighbourhood of Lyons, and in the valley of St. Martin, near Lucern, in Switzerland.

10. PINUS (*Canadensis*) foliis solitariis linearibus obtusiusculis submembranaceis. Lin. Sp. Plan. 1421. Abies foliis solitariis confertis obtusis membranaceis. Gron. Virg. 191. *The Canada Pine*.

This is a native of North-America, from whence the seeds were brought to England. This tree by the natives is called the White Spruce Pine. It grows on the mountains and higher lands, and arrives at a much greater size than many of the other sorts.

This genus of plants belongs to the class and order *Monoecia Monodelphia*, there being male and female flowers on the same plant, and the stamina joined in one body at their base.

All the sorts of Pines are produced from seeds which grow in hard woody cones. These seeds are got by laying the cones before a very gentle fire, or rather by exposing them to the beams of the sun, and often turning them. The seeds of the Larch-tree are particularly difficult to separate from the cone, so that we are generally obliged to be at the expence of splitting the cones into quarters with knives; an operation both tedious and expensive.

“The best season for sowing the seeds of Pines is about the end of March; and when the seeds are sown the beds should be covered with nets, otherwise, when the plants begin to appear with the hulk of the seed on their heads, the birds will pick them off and destroy them.

“Where the quantity of seeds to be sown is not great, it will be a good way to sow them either in boxes or pots, filled with light loamy earth, which may be removed from one situation to another, according to the season of the year; but if there is a large quantity of the seeds, so as to require a good space to receive them, they should

Book II. plantation than the Pine: If you be necessitated to plant towards the latter end of summer, lay a pretty deal of horse-litter upon the surface of the ground, to keep off the heat, and in winter the cold; but let no dung touch either stem or root: You may likewise sow in such earth about February; they will make a shoot the very first year of an inch; next an handful; the third year three feet, and thenceforward above a yard annually. A northern Gentleman (who has obliged me with this process upon his great experience) assures me that Fir, and this Feralis Arbor, as Virgil calls the Pine, are abundantly planted in Northumberland, which are in few years grown to the magnitude of ship-masts; and from all that has been

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“ be sown on an east or north-east border, where they may be screened from the sun, whose heat is very injurious to these plants at their first appearance above ground. Those seeds which are sown in pots or boxes, should also be placed in a shady situation, but not under trees; and if they are screened from the sun with mats at the time when the plants first come up, it will be a good method to preserve them.

“ Most of the sorts will come up in about six or seven weeks after they are sown; but the seeds of the Stone or cultivated Pine, and two or three of the others, whose shells are very hard, frequently lie in the ground a whole year; so that when the plants do not come up the first year, the ground should not be disturbed, but kept clean from weeds, and the following spring the plants will rise. This frequently happens in dry seasons, and when they are sown in places a little too much exposed to the sun. Therefore the surest method is, to soak the seeds in water twenty-four hours before they are sown.

“ When the plants appear, they must be constantly kept clean from weeds; and in very dry seasons, if they are now and then gently refreshed with water, it will forward their growth; but this must be done with great care and caution, for if they are hastily watered, it will wash the tender plants out of the ground, or lay them down flat, which often rots their stalks; so that unless it be judiciously performed, it will be the best way to give them no water, but only screen them from the sun.

“ If the plants come up too close, it will be a good method to thin them gently about the middle of July. The plants which are drawn up may then be planted on other beds which should be prepared ready to receive them, for they should be immediately planted as they are drawn up, because their tender roots are soon dried and spoiled at this season of the year. This work should be done, if possible, in cloudy or rainy weather, and then the plants will draw out with better roots, and will soon put out new fibres again; but if the weather should prove clear and dry, the plants should be shaded every day from the sun with mats, and now and then gently refreshed with water. In drawing up the plants, there should be great care taken not to disturb the roots of the plants left remaining in the seed-beds; so that if the ground be hard, the beds should be well watered some time before the plants are thinned, to soften and loosen the earth; and if after the plants are drawn

said, deduces these encouragements: 1. The facility of their propagation; 2. the nature of their growth, which is to affect places where nothing else will thrive; 3. their uniformity and beauty; 4. their perpetual verdure; 5. their sweetness; 6. their fruitfulness, affording seed, gum, fuel, and timber, of all other woods the most useful and easy to work; all which highly recommend it as an excellent improvement of husbandry, fit to be enjoined by some solemn edict to the inhabitants of this our island, that we may have masts, and those other materials of our own growth. In planting the Silver Abies, set not the roots too deep; it affects the surface more than the rest.

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4. The Pine (of which are reckoned no less than ten several sorts, preferring the domestic, or sativa, for the fuller growth) is likewise of both

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“out, the beds are again gently watered to settle the earth to the roots of the remaining plants, it will be of great service to them, but it must be done with great care, so as not to wash out their roots, or lay down the plants. The distance which should be allowed these plants in the new beds, may be four or five inches row from row, and three inches in the rows.

“Let the plants remain in the seed-bed till the spring twelvemonth, by which time they will be fit to transplant where they are to remain for good, for the younger the plants are when planted out, the better they will succeed; for although some sorts will bear transplanting at a much greater age, yet young plants planted at the same time will, in a few years, overtake the large ones, and soon outstrip them in their growth; and there is this advantage in planting young, it saves the expence of staking, and much watering, which large plants require. I have often seen plantations of several sorts of Pines, which were made of plants six or seven feet high, and at the same time others of one foot high planted between them, which in ten years were better trees than the old ones, and much more vigorous in their growth; but if the ground where they are designed to remain cannot be prepared by the time before-mentioned, the plants should be planted out of the beds into a nursery, where they may remain two years, but not longer; for it will be very hazardous to remove these trees at a greater age.

“The best season to transplant all the sorts of Pines is about the latter end of March or the beginning of April, just before they begin to shoot; for altho’ the Scotch Pine, and some of the most hardy sorts, may be transplanted in winter, especially when they are growing in strong land, where they may be taken up with balls of earth to their roots; yet this is what I would not advise for common practice, having frequently seen it attended with bad consequences; but those which are removed in the spring rarely fail.

“Where these trees are planted in exposed situations, they should be put pretty close together, that they may shelter each other; and when they have grown a few years,

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sexes, whereof the male growing lower, with a rounder shape, hath its wood more knotty and rude than the female; it is lank, longer, narrow, and pointed; bears a black, thick, large cone, including the kernel within an hard shell, covered under a thick scale: The nuts of this tree (not much inferior to the Almond) are used, among other ingredients, in beatilla-pies at the best tables. They should be gathered in June before they gape; and having hung two years (for there will be always some ripe, and some green on the same tree) preserve them in their nuts, in sand, as you treat acorns, &c. till the season invite, and then set or sow them in ground which is cultivated like the Fir in most respects; only you may bury the nuts a little deeper. By a friend of mine they were rolled in a fine compost made of sheeps' dung, and scattered in February, and this way never failed Fir and Pine; they came to be above an inch high by May; and a Spanish author tells us, that to macerate them five days in a child's urine,

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" part of the plants may be cut down to give room for the others to grow; but this
 " must be gradually performed, lest, by too much opening the plantation at once, the
 " air should be let in among the remaining trees with too great violence, which will
 " stop their growth.

" Although these Evergreen-trees are by many persons despised on account of their
 " dark green in summer, yet a proper mixture of them in large clumps makes a fine
 " appearance about a seat in winter; and in summer, by their contrast with other trees,
 " they have a good effect in diversifying the scene.

" Wherever large plantations are designed to be made, it will be proper to form the
 " nursery upon a piece of good ground as near the plantation as possible; or the cot-
 " tagers may be induced to raise the feeds, which will give employment to the women
 " and children at a time when the farmer has least occasion for their assistance.

" The Scotch Pine, as was before observed, being the hardiest of all the kinds, and
 " the wood of it the most useful, is the sort which best deserves our care. This will
 " thrive upon the most barren sands, where scarce any thing else, except Heath and
 " Furze, will grow. There are many thousand acres of such land lying convenient
 " for water carriage, (at present affording no benefit to the public) that might, by
 " plantations of these trees, become good estates to their proprietors, and also a na-
 " tional benefit; and as the legislature has taken this into consideration, and al-
 " ready passed some laws for the encouraging these plantations, as also for their pre-
 " servation and security, so it may be hoped that this improvement will be under-
 " taken by the Gentlemen who are possessed of such lands in all the different parts
 " of the kingdom; for although they may not expect to receive much profit from
 " these plantations in their own time, yet their successors will be highly benefited;
 " and the pleasure which those growing trees will afford, by beautifying the present
 " dreary parts of the country, will in some measure recompense them for their trouble

and three days in water, is of wonderful effect: This were an expeditious process for great plantations; unless you would rather set the Pine as they do peas, but at wider distances, that when there is occasion of removal, they might be taken up with the earth and all; I say taken up, and not removed by evulsion, because they are, of all other trees, the most obnoxious to miscarry without this caution; and therefore it were much better, where the nuts might be commodiously set and defended, never to remove them at all, it gives this tree so considerable a check. The safest course of all, were to set the nuts in an earthen pot, and, in frosty weather, shewing it a little to the fire, the entire clod will come out with them, which are to be reserved, and set in the naked earth, in convenient and fit holes prepared before-hand, or so soon as the thaw is universal.

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“and expence; and by creating employment for the poor, lessen those rates which are now so high in many parts of this kingdom.

“The expence of making these plantations is what most people are afraid of; but the greatest expence is that of fencing them from the cattle, &c. for the other is trifling, as there will be no necessity for preparing the ground to receive the plants; and the charge of planting an acre of land with these plants will not be more than twenty or thirty shillings where labour is dear, exclusive of the plants, which may be valued at forty shillings more. I have planted many acres of land with these trees, which were covered with Heath and Furze, and only dug holes between to put in the plants, and afterward laid the Heath or Furze, which was cut, upon the surface of the ground about their roots, to prevent the ground from drying—and few of the plants have failed. These plants were most of them four years old from seed, nor was there any care taken to clean the ground afterward, but the whole left to shift for themselves; and in five or six years the Pines grew so well as to overpower the Heath and Furze, and destroy it.

“The distance which I generally allow these plants, in all large open situations, is about four feet, but always irregular, avoiding planting in rows as much as possible; and in the planting, great care should be used not to take up the plants faster than they can be put down, so that some men should be employed in digging up the plants while others are planting. Those who take up the plants must be looked after, to see they do not tear off the roots, or wound the bark; and as fast as they are taken up, their roots should be covered to prevent their drying, and put into their new quarters as soon as possible. In planting them, care should be had to make the holes large enough for their roots, as also to loosen and break the clods of earth, and put the finest immediately about their roots, then to settle the earth gently with the foot to the roots of the plant. If these things are duly observed, and a proper season be chosen for planting, there will be very little hazard of success; but I have seen some plantations made with plants which

BOOK II. Some commend the strewing a few oats at the bottom of the fosses or pits in which you transplant the naked roots, for a great promotement of their taking, and that it will cause them to shoot more in one year than in three: But to this I have already spoken. Other kinds not so rigid, nor the bark, leaf, cone and nuts so large, are those called the Mountain-Pine, a very large stately tree. There is likewise the Wild or Bastard-Pine and Teda, clad with thin long leaves, and bearing a turbinated cone: Abundance of excellent rosin comes from this tree. There is also the Pinafter, another of the wild kind; but none of them exceeding the Spanish, called by us the Scotch Pine, for its tall and erect growth.

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“ were brought from a great distance, and had been so closely packed up as to cause a
 “ heat, whereby most of the plants within had their leaves changed yellow, and few
 “ of them have grown, which has discouraged others from planting, not knowing
 “ the true cause of the failure.

“ After the plantations are made, the only care they require for five or six years,
 “ will be to secure the plants from cattle, hares, and rabbits; if these are admitted to them, they will make great destruction in a short time; for if the branches
 “ are gnawed by hares or rabbits, it will greatly retard the growth of the plants, if
 “ not destroy them intirely.

“ In about five or six years after planting, the branches of the young trees will
 “ have met, and begin to interfere with each other; therefore they will require a
 “ little pruning, but this must be done with great caution. The lower tier of
 “ branches only should be cut off; this should be performed in September, at which
 “ time there will be no danger of the wounds bleeding too much, and the turpentine
 “ will harden over the wounds as the season grows cold, so will prevent the wet
 “ from penetrating the wounds. These branches should be cut off close to the stem
 “ of the plants, and care should be taken in doing this, not to break any of the remaining branches of the young trees. This work should be repeated every other
 “ year, at each time taking off only the lower tier of branches; for if the plants are
 “ much trimmed, it will greatly retard their growth, as it does in general that of
 “ all trees; but as these trees never put out any new shoots where they are pruned, so
 “ they suffer more from amputation than those which do.

“ In those parts of France where they have forests of these trees, the proprietors
 “ always give the fagots to those who prune their young trees first for their labour,
 “ so it costs them no money. At the second pruning the proprietor has one-third
 “ of the fagots, and the dressers have the other two for their work; and afterward
 “ the fagots are equally divided between the workmen and proprietors; but there must
 “ be great care taken that they do not cut off more than they ought.

“ In about twelve or fourteen years these will require no more pruning, for their
 “ upper branches will kill those below where they have not air; but soon after this, if

proper for large and ample walks and avenues; several of the other wild sorts inclining to grow crooked. But, for a more accurate description of these coniferous trees, and their perfect distinctions, consult our Mr. Ray's most elaborate and useful work, where all that can be expected or desired, concerning this profitable, as well as beautiful tree, is amply set down. Hist. Plant. lib. xxv. cap. i.

5. I am assured, by a person most worthy of credit, that in the territory of Alzey, (a country in Germany where they were miserably distressed for wood, which they had so destroyed, as that they were reduced to make use of straw for their best fuel) a very large tract being newly plowed, (but the wars surprizing them they did not sow) there sprung up

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“the plants have made good progress, it may be necessary to thin them; and this should be gradually performed, beginning in the middle of the plantation first, leaving the outside close to screen those within from the cold, so by degrees coming to them at last, whereby those which were first thinned will have had time to get strength, so will not be in danger of suffering from the admission of cold air. When these plantations are thinned, the trees should not be dug up, but their stems cut off close to the ground; for their roots never shoot again, but decay in the earth, so there can no harm arise by leaving them, and hereby the roots of the remaining plants are not injured. The trees which are now cut will be fit for many purposes: Those which are straight will make good putlocks for the bricklayers, and serve for scaffolding-poles; so that there may be as much made by the sale of these, as will defray the whole expence of the planting, and probably interest of the money besides.

“As the upright growth of these trees renders their wood the more valuable, they should be left pretty close together, whereby they will draw each other up, and grow very tall. I have seen some of these trees growing, whose naked stems have been more than seventy feet high, and as straight as a walking-cane; and from one of these trees there were as many boards sawed, as laid the floor of a room near twenty feet square. If these trees are left eight feet asunder each way, it will be sufficient room for their growth; therefore if, at the first thinning, a fourth part of the trees are taken away, the others may stand twelve or fourteen years longer, by which time they will be of a size for making ladders and standards for scaffolding, and many other purposes; so that, from this sale, as much may be made, as not only to pay the remaining part of the expence of planting, if any should be wanting in the first, but rent for the land with interest.”

Although this long extract from Mr. Miller may not perfectly coincide with the sentiments of every planter of Pines, yet in general I think it will be of use.—The following letter, addressed to me by James Farquarson, Esq; upon the method of raising

BOOK II. the next year a whole forest of Pine-trees, of which sort of wood there was none at all within less than fourscore miles; so as it is verily conjectured by some, they might be wafted thither from the country of Westra-sia, which is the nearest part to that where they grow. If this be true, we are no more to wonder how, when our Oak-woods are grubbed up, Beech, and trees of other kinds have frequently succeeded them. What some impetuous winds have done in this nature, I could produce instances almost miraculous. I shall say nothing of the opinion of our Master Varro, and the learned Theophrastus *, who were both of faith that the seeds of plants dropped out of the air. Pliny, in book xvi. chap. xxxiii. upon discourse of the Cretan Cypress, attributes much to the indoles, and nature of the soil, virtue of the climate, and impressions of the air. And

* De Causis,
lib. I. cap. v.

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the Larch and the Scotch Pine, will, I flatter myself, be highly acceptable. Such liberal communications deserve greatly of the public.

Marlee, (Scotland) June 22, 1775.

“ ————— In order to raise plantations of the Scotch Fir, let the cones be gathered in the month of February, or March, from thriving young trees, as the old ones are not easily accessible, nor so productive of seed. These are to be exposed to the heat of the sun, thinly spread on any kind of coarse canvas, taking them under cover in the night-time, and only exposing them when the sun shines. This soon makes the cones expand with a crackling noise. When any quantity of the seed is shed, it must be separated from the cones by a search, otherwise the first-dropped seeds would become too dry before the cones yielded their whole quantity, which often takes up a considerable time; so that we are sometimes obliged to dry the cones in kilns, to make them give their contents in time for sowing—which ought to be done the end of April or beginning of May. The first method of procuring the seed is certainly the most eligible, tho’ the other answers very well when attentively performed, so as not to damage the seed by too much heat. A light loamy soil, trenched a foot and a half deep, and laid out in beds five feet broad, answers the best for sowing. Let the seeds be sown very thick, and covered with a thick sifting of mould from the alleys. Plants raised in this manner will rise like a brush. No kind of manure should be given to the beds, as productive of weeds; the drawing of which not only brings up many of the tender plants, but loosens the ground, and makes blanks that let in frosts in winter and drought in summer. To give an idea of the sowing, I never consider my crop of plants good, unless I have above a thousand in each foot long of the beds, that is, in five square feet. Upon their having two seasons growth, I plant them out irregularly from the seed-bed, about three feet asunder, upon the mountainous grounds where they are to rise to perfection. I begin to plant the driest ground in autumn, eighteen months after sowing, and persist in this operation until the frost prevents me. I begin again in February, or rather as the

indeed it is very strange, what is affirmed of that pitchy-rain, reported to have fallen about Cyrene, the year 430 V. C. after which, in a short time, sprung up a whole wood of the trees of *Laferpitium*, producing a precious gum, not much inferior to Benzoin, if at least the story be warrantable. But these aerial irradiations, various conceptions, and equivocal productions without seed, &c. are difficulties to be solved by our philosophers; also whence those leaves of the *Platan* come, which Dr. Spon tells us, in his Travels, are found floating in some of the fountains of the isles of the *Strophades*, no such tree growing near them by thirty miles: Tho' these may haply be conveyed through some unknown subterranean passage; for were it by the wind, it having a very large leaf, they would be seen flying in, or falling out of the air:

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“ weather admits, and continue this work sometimes to the end of April, so as to plant
 “ out the product of the two-year old seed-beds. I put the plants into the ground
 “ with two cuts of a spade, thus >. I raise the point of the angle with what we
 “ call a Dibble, and laying the plant up to the neck, stamp down the raised sod with the
 “ foot. In this method two men may plant a thousand in a day. When the ground
 “ is rocky, or very stony, I use a Dibble shod with Iron, having a cleft at the extre-
 “ mity to lead down the root; putting the plants into the ground in the manner that
 “ Cabbages are planted. One man will plant as many in this way as two in the other;
 “ yet the first method is preferable where the ground admits of it, as I have always
 “ observed fewer plants to fail. My reason for planting from the seed-bed is, that it
 “ comes nearest to the operation of Nature. Plants removed from the seed-bed into
 “ the nursery, must have their roots pruned considerably before they can be planted
 “ into the pits where they are to continue, which adds greatly to the expence. Be-
 “ sides, *Nursing* this hardy mountainous tree causes a luxuriant growth, which spoils
 “ its nature and robs it of longevity.

“ It is generally believed that there are two kinds of Fir-trees, the produce of Scot-
 “ land, viz. the red or resinous large trees, of a fine grain, and hard solid wood;
 “ the other, a white-wooded Fir, with a much smaller proportion of resin in it, of a
 “ coarser grain, and a soft spongy nature, never comes to such a size, and much
 “ more liable to decay. At first appearance this would readily denote two di-
 “ stinct species, but I am convinced that all the trees in Scotland, under the deno-
 “ mination of Scotch Fir, are the same; and that the difference of the quality of
 “ the wood, and size of the trees, is entirely owing to circumstances, such as the
 “ climate, situation, and soil they grow in. The finest Fir-trees appear in the most
 “ mountainous parts of the Highlands of Scotland, in glens or on sides of hills ge-
 “ nerally lying to a northerly aspect, and the soil of a hard gravelly consistence,
 “ being the natural produce of these places; the winged seeds are scattered in quanti-
 “ ties by the wind, from the cones of the adjacent trees, which expand in April and

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6. In transplanting of these coniferous trees, which are generally resinaceous, viz. Fir, Pine, Larix, Cedar, and which have but thin and single roots, you must never diminish their heads, nor be at all busy with their roots, which pierce deep, and is all their foundation, unless you find any of them bruised, or much broken; therefore such down-right roots as you may be forced to cut off, it were safe to sear with an hot iron, and prevent the danger of bleeding, to which they are obnoxious even to destruction, though unseen and unheeded. Neither may you disbranch them, but with great caution, as about March, or before, or else in September, and then it is best to prune up the side-branches close to the trunk, cutting off all that are above a year old; if you suffer them too long, they grow too big, and the cicatrice will be more apt to spend the

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“ May with the heat of the sun; these seedlings, when young, rise extremely close together, which makes them grow straight, and free from side-branches of any size, to the height of fifty or sixty feet before they acquire the diameter of a foot: even in this progress to height they are very slow, occasioned by the poorness of the soil, and the numbers on a small surface, which I may say makes them in a constant state of war for their scanty nourishment, the stronger and tallest by degrees overtopping the weaker, and when the winds blow they lash against one another; this assists in beating off any horizontal branches that might damage the timber with knots, as well as by degrees crushes the overtopped trees. In such state of hostility they continue struggling until the master-trees acquire some space around them; then they begin to shoot out in a more bushy manner at the top, gradually losing their spiral form, increasing afterwards more in size of body than height, some acquiring four feet diameter, and about sixty feet of height to the branches, fit for the finest deal board. The growth is still extremely slow, as is plainly proved by the smallness of the grain of the wood, which appears distinctly in circles from the center to the bark. Upon cutting a tree over close at the root, I can venture to point out the exact age, which, in these old Firs, comes to an amazing number of years. I lately pitched upon a tree of two feet and a half diameter, which is near the size of a planted Fir of fifty years of age, and I counted exactly two hundred and fourteen circles or coats, which makes this natural Fir above four times the age of the planted one. Now as to planted Firs, these are raised first in dressed ground from the seed, where they stand two seasons or more, then are planted out in the ground they are to continue in at regular distances, have a clear circumference round them for extending both roots and branches; the one gives too quick nourishment to the tree which shoots out in luxuriant growth, and the other allows many of the branches to spread horizontally, spoiling the timber with knots; besides, this quick growth occasions these thick yearly circular coats of wood, which form a coarse grain of a spongy soft nature. The juices never after ripen into a proportional

tree in gum; upon which accident, I advise you to rub over their wounds with a mixture of cow-dung; the neglect of this cost me dear, so apt are they to spend their gum. Indeed, the Fir and Pine seldom out-live their being lopped. Some advise us to break the shells of Pines, to facilitate their delivery, and I have essayed, but to my loss; nature does obstetrate and do that office of herself, when it is the proper season; neither does this preparation at all prevent those which are so buried, whilst their hard integuments protect them both from rotting, and the vermin.

Pinastes, the domestic Pine, grows very well with us, both in moun- PINASTER.
tains and plains. But the Pinafter, or wilder, of which are four sorts, best for walks: *pulcherrima in hortis*, as already we have said, because it grows tall and proud, maintaining its branches at the sides, which the other Pine does less frequently. There is in New-England a very broad Pine, which increaseth to a wonderful bulk and magnitude, insomuch that large canoes have been excavated out of the body of it, without any

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“ quantity their resinous preservative balm; so that the plantations decay before the
“ wood acquires age, or a valuable size; and the timber, when used in work, has nei-
“ ther strength, beauty, nor duration. I believe the climate has likewise a great share
“ in forming the nature of the best wood, which I account for in the following man-
“ ner: The most mountainous parts of the Highlands, particularly the northerly
“ hanging situations, where these fine Fir-trees are, have a much shorter time of
“ vegetation than a more southerly exposure, or the lower open countries, being shaded
“ by high hills from the rays of the sun, even at mid-day, for months together; so
“ that, with regard to other vegetables, nature visibly continues longer in a torpid
“ state there than in other places of the same latitude. This dead state of nature for
“ so long a time yearly, appears to me necessary to form the strength and health of
“ this particular species of timber. No doubt they may at first shew a gratefulness
“ for better soil and more sun, by shooting out spontaneously; but if the plant or tree
“ is so altered by this luxury, that it cannot attain any degree of perfection fit for the
“ purposes intended, the attempt certainly proves in vain.

“ From what is said above, it is not at all my intention to dissuade from *planting*
“ Scotch Fir, but to encourage those that have the proper soil and situation to do so;
“ being of opinion that where these circumstances agree, and there, planting not in
“ lines, but irregularly and thicker than common, the trees will come to be of equal
“ size and value with the *natural* ones. In confidence of this, I have planted several
“ millions on the sides of hills, out of the reach of seed from the natural Firs.

“ As to the Larch, it grows in this country, in great abundance, from the seed of
“ our own plantations. I have found this beautiful and hardy tree to answer extremely
“ well when planted out, on barren grounds, from six inches to six feet high; and

Book II. addition. But besides these large and gigantic Pines, there is the Spinet, with sharp thick bristles, yielding a rosin or liquor odorous, and useful in carpentry work.

8. The Fir grows tallest, being planted reasonably close together, but suffers nothing to thrive under it. The Pine not so inhospitable; for, by Pliny's good leave, it may be sown with any tree, all things growing well under its shade, and excellent in woods: Hence Claudian,

Et comitem quercum Pinus amica trahit.

The friendly Pine the mighty Oak invites.

9. They both affect the cold, high and rocky grounds, *Abies in montibus altis*. Those yet which grow on the more southern and less-exposed quarters, a little visited with the beams of the sun, are found to thrive beyond the other, and to afford better timber; and this was observed long since by Vitruvius of the Infernates, as he calls them, in comparison with the Supernates, which, growing on the northern and shady side of the Appenines, were nothing so good, which he imputes to the want of due digestion. They thrive, as we said, in the most sterile places, yet

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“ they are seldom known to fail, except where water has reached their roots. I have
 “ often remarked, with surprize, that when Cattle or Deer have broken off the main
 “ shoots with their horns, another branch has taken the lead, and stretched away at
 “ such a rate as to heal up the wound so compleatly, that in a few years it was with
 “ difficulty I could discover the traces of the injury. The amazing growth of the
 “ *Larix* far exceeds with me all the native as well as foreign trees, bearing the expo-
 “ sure and inclemency of the season better than any of them; and of late I have the
 “ pleasure to find that they naturalize themselves by sowing. I wish my experience
 “ could assist me in speaking with as much certainty with regard to the value and use-
 “ fulness of the timber; but in that I can give but little satisfaction, as my oldest
 “ trees are not thirty years from the seed. At Dunkeld I have seen a small summer-
 “ house finished with *Larix* wood; the plants came from London in earthen pots,
 “ about the year 1740, rather as a curiosity than from any expectation of their excel-
 “ lency. Though full of circular knots, the wood looked well, and did not seem to
 “ gall or warp so much as Fir of the same age and seasoning would have done. It
 “ will be necessary to remark, that the heart or center of large trees is generally the
 “ knottiest part of the trunk, occasioned by the collateral branches, when young, sup-
 “ porting the stem to stature, which, as the tree advances, die and fall off; and this is

will grow in better, but not in over-rich and pinguid. The worst land in Wales bears, as I am told, large Pine; and the Fir, according to his aspiring nature, loves also the mountain more than the valley; but ἐν τοῖς παλαιοῖς ὅλος εἰ φέται, it cannot endure the shade, as Theophrastus observes, de Plin. lib. iv. cap. i. But this is not rigidly true, for they will grow in consort, till they even shade and darken one another; and will also descend from the hills, and succeed very well, being desirous of plentiful waterings, till they arrive to some competent stature; and therefore they do not prosper so well in an over sandy and hungry soil or gravel, as in the very entrails of the rocks, which afford more drink

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“ particularly evident in trees that grow in thickets. The surface soon heals over, “ and the body of the tree is annually increased by circular rings of wood. I shall “ suppose a tree to be a foot in diameter when the lower branches die and drop off. “ In course of time it acquires four feet in diameter, which gives a surrounding coat, “ one foot and a half in thickness, of clean timber, the center remaining knotty. The “ growth of the Larix, and manner of dropping its branches when close together, very “ much resembles the Fir; so I am confident this fault of knottiness, which seems to “ be the principal one, will amend by age. Yours, &c.”

It would appear from the hardy nature of the Fir, and the readiness with which it grows in almost every part of this island, that it was an indigenous tree; yet Cæsar expressly says that it is not a native. In his description of the country, he observes, that Britain had all the trees of Gaul, except the Beech and Fir: *Materia cujusque generis, ut in Gallia, præter Fagum et Abietem*. As all the British words for the Beech are clearly of Roman derivation, Faighe, Faghe, or Faydh, it is probable that it was introduced into Britain with the Roman colonies; but with regard to the Fir, the case is otherwise, for many of its names are purely British; and this I esteem a testimony not to be overthrown. The ingenious Mr. Whittaker, in the first volume of his History of Manchester, p. 309, treats this subject with great learning and precision; he says: “ Among the many Roman names for “ the Fir in the British language, there are three which are purely and absolutely “ British. The Scotch distinguish the Fir by the British appellation of Gius; the “ Irish, by the British appellation of Giumhus; and the Welch, by the British appellation of Fynnidtydh. Had the Fir been originally introduced into the fields of “ Britain by the Romans, all the British appropriated appellations of it must have “ been, as some of them evidently are, the mere derivatives of the Roman Abies, “ Z-aban, S-ibuydh, S-apin, and S-abin. And the existence of one British appropriated appellation for the Fir is a strong argument in itself that the tree was not introduced by the Romans, but that it was originally British.

“ Firs actually appear as early as the third century in the unromanized regions of Ca-
ledonia and Ireland, and appear as the acknowledged Aborigines of the country. Firs

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to the roots that penetrate into their meanders and winding recesses. But though they require this refreshing at first, yet do they perfectly abhor all stercoration; nor will they much endure to have the earth opened about their roots for ablaqueation, or be disturbed: This is also to be understood of Cypress. A Fir, for the first half-dozen years, seems to stand, or at least make no considerable advance, but it is when thoroughly rooted, that it comes away miraculously. That honourable and learned Knight, Sir Norton Knatchbull, whose delicious plantation of Pines and Firs I beheld with great satisfaction, has assured me, that a Fir-tree of his raising did shoot no less than sixty feet in height in little

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“are frequently mentioned in the poems of the Caledonian bard, not as plants seen by him on the continent or in the provinces, not merely as forming the equivocal imagery of a similitude, but as actually and antiently growing in both. The spear of a warrior, says an Irishman in Ulster, pointing to a neighbouring tree, *is like that blasted Fir*: And it is compared by another to the Fir of Slimora particularly, a mountain in the north of Ireland. And the tomb of a fallen warrior, upon the western shore of Caledonia, is thus described from the reality by the bard: *Doff thou not behold, Makvina, a rock with its head of heath? Three aged Firs bend from its face, green is the narrow plain at its feet.*

“The Fir is also discovered in our Mancunian mosses together with the Birch and the Oak, as frequent as the Oak, and much more frequent than the Birch. The Fir of our mosses is not, as the wild hypothesis of some asserts it to be, a mere mimicry of the natural Fir, merely an Oak or a Birch that, lying for ages in the unctuous mass, has discharged itself of all its original properties, and has adopted all the characteristic properties of the Fir. Had this been the case, it could not possibly be distinguished from the Oak or the Birch, and all the trees of our mosses must have been equally and absolutely Firs. The Fir is the only tree of our mosses that exhibits a resinous quality. And the Fir of our mosses is as much discriminated to the eye, by the peculiar nature of its grain, as the Oak or the Birch. Nor is this all: The Fir is perpetually discovered in such of our mosses particularly as were demonstrably prior to the settlement of the Romans among us. It is discovered in such mosses as appear to the present period actually traversed by the roads of the Romans. It is discovered immediately adjoining to the road, and absolutely on both sides of it. Thus is the Fir found very frequent in the moss of Failsworth, close to either margin of the street, and mingled with Oaks and Birches. And as the road demonstrates the moss to have been formed before the settlement of the Romans at Manchester, so the trees discovered in the moss must have been all equally cotemporary with it, and all equally with it prior to the settlement of the Romans at Manchester. This argument carries a decisive authority with it: But we can prosecute it fairly up to demonstration: The Fir has been discovered in our

more than twenty years. The same speedy growth may be observed in the trees belonging to Sir Peter Wentworth at Lillingston-Lovel; Cornbury in Oxfordshire; and other places; but especially those in Harefield park, in the county of Middlesex, belonging to Mr. Serjeant Nudigate, where there are two Spanish or Silver Firs, that, being planted there anno 1603, at two years growth from the seed, are now (1679) become goodly mafts: The biggest of them, from the ground to the upper bough, is eighty-one feet, though forked on the top, which has not a little impeded its growth: The girt or circumference below is thirteen feet, and the length, so far as is timber, that is, to six inches square, seventy-three feet; in the middle, seventeen inches square, amounting by calculation to one hundred and

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“mosses, not only in such parts as are immediately contiguous to the Roman roads
 “over them, but in such as are actually occupied and covered with the line of the
 “Roman roads, and in the black spongy earth immediately beneath the Roman gravel.
 “It has been very recently dug up by myself under the roots of the road over Failf-
 “worth Mofs. And I have now in my own possession two pieces of tried genuine
 “Fir that were bedded with the remains of a Birch-tree one yard and a half in the
 “mossy soil, and three yards under the crown of the Roman gravel.

“These are three arguments which are all sufficiently convincing of themselves.
 “These are three arguments which, springing from as many different sources, all
 “happily unite together in one common channel, and form together an irresistible
 “tide of evidence. And a fact which relates to the remotest antiquity, and which
 “is asserted against the highest historical authority, cannot be too powerfully demon-
 “strated. The Fir then was one of the trees of Britain before the arrival of the Ro-
 “mans among us.”

The Pine was sacred to Cybele, who turned her beloved Attis into that tree.

Et succincta comas, hirsutaque vertice Pinus;

Grata Deum matri. Siquidem Cybeleius Attis

Exiit hac hominem, truncoque induruit illo. OVID. MET.

It was a custom among the antients, when they gave over any employment, to devote their instruments, and hang them up in some sacred place. Virgil alludes to this custom when he makes Corydon say,

Hic arguta sacra pendebit fistula Pinu. ECL. viii.

Pendebatque vagi pastoris in arbore votum

Garrula sylvestri fistula sacra Deo.

PROPERT.

Some years ago a stone was discovered in *Provence*, in *France*, on which was figured a Pine-tree with all the symbols of Cybele and Attis. Two tympanums hang on the branches of the tree on one side, and on the other a *pastoral pipe*, agreeable to antient custom.

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forty-six feet of good timber. The other tree is indeed not altogether so large, by reason of its standing near the house when it was burnt, about forty years since, when one side of the tree was scorched also; yet it has not only recovered that scar, but thrives exceedingly, and is within eight or nine feet as tall as the other, and would probably have been the better of the two, had not that impediment happened, it growing so taper and erect, as nothing can be more beautiful. This, I think, if we had no other, is a pregnant instance, as of the speedy growing of that material, so of all the encouragement I have already given for the more frequent cultivating this ornamental, useful, and profitable tree, abounding, doubtless, formerly in this country of ours, if what a grave and authentic author writes be true, Athenæus relating, that the stupendious vessel, built so many ages since by Hiero, had its mast out of Britain. Take notice, that none of these mountainous trees should be planted deep, but as shallow as may be, for their competent support.

PICEA. 10. The Picea, already described, grows on the Alps among the Pine; but neither so tall nor so upright, but bends its branches a little, which have the leaf quite about them, short and thick, not so flat as the Fir. The cones grow at the point of the branches, and are much longer than most other cones, containing a small darkish seed. This tree produces a gum almost as white and firm as frankincense: But it is the Larix (another sort of Pine) that yields the true Venetian turpentine, of which hereafter.

11. There is also the Piceaster, already mentioned, a wilder sort, the leaves stiff and narrow-pointed, and not so close, out of which the greatest store of pitch is boiled. The Tæda likewise, which is, as some think, another sort abounding in Dalmatia, more unctuous, and more patient of the warmer situations, and so inflammable, that it will slit into candles; and therefore some will by no means admit it to be of a different species, but a metamorphosis of over-grown fatiness, to which the most judicious incline. But of these, the grand Canaries, and all about the mountains near Teneriff, are full, where the inhabitants do usually build their houses with the timber of the Pitch-tree. They cut it also into wainscot, in which it succeeds marvellously well; abating that it is so obnoxious to firing, that whenever a house is attacked they make all imaginable haste out of the conflagration, and almost despair of extinguishing it. They there also use it for candle-wood, and to travel in the night by the light of it, as we do by links and torches. Nor do they make these Tæas, as the Spa-

riards call them, of the wood of Pine alone, but of other trees, as of Oak and Haseel, which they cleave and hack, and then dry in the oven or chimney, but have certainly some unctuous and inflammable matter in which they afterwards dip it: But thus they do in Biscay, as I am credibly informed.

12. The bodies of these being cut, or burnt down to the ground, will emit frequent suckers from the roots; but so will neither the Pine nor Fir, nor indeed care to be topped. But the Fir may be propagated of layers and cuttings, which I divulge as a considerable secret that has been essayed with success.

13. That all these, especially the Fir and Pine, will prosper well with us, is more than probable; because it is a kind of demonstration, that they did heretofore grow plentifully in Cumberland, Cheshire, Staffordshire, and Lancashire, if the multitudes of these trees to this day found entire, and buried under the earth, though supposed to have been overthrown, and covered so over since the universal deluge, be indeed of this species. Dr. Plot speaks of a Fir-tree in Staffordshire of one hundred and fifty feet high, which some think of spontaneous growth, besides several more so irregularly standing, as shews them to be natives. But to put this at last out of controversy, see the extract of Mr. de la Prim's letter to the Royal Society, Transactions, number 277, and the old map of Crout, and of the yet, or lately remaining Firs growing about Hatfield in the commons, flourishing from the shrubs and stubs of those trees, to which I refer the reader. As for buried trees of this sort, the late Dr. Merrett, in his Pinax, mentions several places of this nation where subterraneous trees are found; as, namely, in Cornwall, *ad finem terræ, in agris Flintis*; in Pembrokehire, towards the shore, where they so abound, *ut totum littus* (says the Doctor) *tanquam silva cædua apparet*; in Cheshire, also (as we said) Cumberland and Anglesey, and several of our Euro-boreal tracts, and are called Noah's ark. By Chatneffe in Lancashire, says Cambden, the low mossy ground was no very long time since carried away by an impetuous flood, and in that place now lies a low irriguous vale, where many prostrate trees have been digged out. And from another I receive, that, in the moors of Somersetshire, towards Bridgewater, some lengths of pasture growing much withered, and parched more than other places of the same ground, in a great drought, it was observed to bear the length and shape, in gross, of trees; they digged, and found in the spot Oaks

SUBTERRA-
NEAN TREES.

Book II. as black as Ebony, and have been from hence instructed to take up many hundreds of the same kind. In a fenny tract of the isles of Axholme, lying part in Lincolnshire, and part in Yorkshire, have been found Oaks five yards in compass, and fifteen in length, some of them erect, and standing as they grew, in firm earth below the moors, with abundance of Fir, which lie more stooping than the Oak, some being thirty-six yards long besides the tops. And so great is the store of these subterraneans, as the inhabitants have for divers years carried away above two thousand cart-loads yearly: See Dugdale's History of Draining. This might be of good use for the like detections in Essex, Lincolnshire, and places either low situate, or adjacent to the sea; also at Binfield-heath in Kent, &c. These trees were (some think) carried away, in times past, by some accident of inundation, or by waters undermining the ground, till their own weight and the winds bowed them down, and overwhelmed them in the mud: For it is observed, that these trees are nowhere found so frequently as in boggy places. But that the burning of these trees so very bright, should be an argument that they were Fir, is not necessary, since the bituminous quality of such earth may be imparted to them. And Camden denies them to be Fir trees, suggesting the query, Whether there may not possibly grow trees even under the ground as well as other things? Theophrastus, indeed, lib. iv. cap. viii. speaks of whole woods, Bays and Olives, bearing fruit; and that of some Oaks bearing acorns, and those even under the sea, which was so full of plants and other trees, as, it is said, Alexander's forces, sailing to the Indies, were much hindered by them. There are in Cumberland, on the sea-shore, trees sometimes discovered at low-water, and at other times, that lie buried in the sand; and in other mossy places of that county it is reported the people frequently dig up the bodies of vast trees without boughs, and that by direction of the dew alone in summer, for they observe it never lies upon that part under which those trees are interred. These particulars I find noted by the ingenious author of the Britannia Baconica. How vast a forest, and what goodly trees were once standing in Holland, and those low countries, till about the year 860, when an hurricane obstructing the mouth of the Rhine, near Catwic, made that horrid devastation good authors mention. And they do this day find monstrous bodies and branches (nay, with the very nuts, most entire) of prostrate and buried trees, in the Veene, especially towards the south, and at the bottom of the waters: Also near Bruges, in Flanders, whole woods have been found twenty ells deep, in which the trunks, boughs,

and leaves do so exactly appear, as to distinguish their several species, with the series of their leaves yearly falling: Of which see Boetius de Boot. CHAP. I.

Dr. Plot, in his Nat. Hist. of Oxfordshire and Staffordshire, mentions divers subterraneous Oaks, black as Ebony, and of mineral substance for hardness, quite through the whole substance of the timber, caused, as he supposes, and learnedly evinces, by a vitriolic humour of the earth, of affinity to the nature of the ink-galls which that kind of tree produces. Of these he speaks of some found sunk under the ground, in an upright and growing posture, to the perpendicular depth of sixty feet; of which one was three feet diameter, of an hardness emulating the politest Ebony: But these trees had none of them their roots, but were found plainly to have been cut off by the kerf. There were great store of Hasel-nuts, whose shells were as sound as ever, but no kernel within. It is there the inquisitive author gives you his conjecture how these deep interments happened; namely, by our ancestors, many ages since, clearing the ground for tillage, and, when wood was not worth converting to other uses, digging trenches by the sides of many trees, in which they buried some, and others they flung into quagmires and lakes to make room for more profitable agriculture. In the mean time, concerning this mossy wood, as they usually term it, because, for the most part, dug up in mossy and moory bogs where they cut for turf, it is highly probable, with the learned Mr. Ray, that these places were, many ages since, part of firm land covered with wood, afterwards undermined and overwhelmed by the violence of the sea, and so continuing submerged till the rivers brought down earth and mud enough to cover the trees, filling up the shallows, and restoring them to terra firma again, which he illustrates from the like accident upon the coast of Suffolk, about Dunwich, where the sea does at this day, and hath for many years past much incroached upon the land, undermining and subverting by degrees a great deal of high ground, so as by antient writings it appears a whole wood of more than a mile and a half, at present is so far within the sea. Now if, in succeeding ages, as it is probable enough, the sea shall by degrees be filled up, either by its own working, or by earth brought down by land-floods, still subsiding to the bottom, and surmounting the tops of these trees, and so the space added again to the firm land, the men that shall then live in those parts will, it is likely, dig up these trees, and as much wonder how they came there, as we do at present those we have been speaking of.

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In the mean time, to put an end to the various conjectures concerning the causes of so many trees being found submerged, for the most part attributed to the destruction made by the Noahitic inundation; after all has been said of what was found in the level of Hatfield, drained at the never-to-be-forgotten charge and industry of Sir Cornelius Vermuiden, I think there will need no more enquiry. For there were discovered trees, not only of Fir and Pitch, but of very goodly Oaks, even to the length of one hundred feet, which were sold at fifteen pounds the tree, black and hard as Ebony; all their roots remaining in the soil, and their natural posture, with their bodies prostrate by them, pointing for the most part north-east: And of such there seemed to be millions of all the usual species natural to this country, sound and firm, Ash only excepted, which were become so rotten and soft, as to be frequently cut through with the spade only; whereas Willows, and other tender woods, continued very found and entire. Many of these subterranean trees, of all sorts, were found to have been cut and burnt down, squared and converted for several uses, into boards, pales, stakes, piles, bars, &c. Some trees half riven, with the wedges sticking in them; broken ax-heads in shape of sacrificing instruments, and frequently several coins of the Emperor Vespasian, &c. There was, among others, one prodigious Oak of one hundred and twenty feet in length, and twelve in diameter, ten feet in the middle, and six at the small end; so as, by computation, this monster must have been a great deal longer; and for this tree was offered twenty pounds. The truth and history of all this is so perfectly described by Allan. de la Pryme, inserted among the transactions of the Royal Society, that there needs no more to be said of it to evince that, not only here, but in other places where such trees are found in the like circumstances, it has been the work and effects of vast armies of the Romans, when finding they could not with all their force subdue the barbarous inhabitants, by reason of their continual issuing out of those intricate fortresses and impediments, they caused whole forests to be cut down by their legions and soldiers, whom they never suffered to remain idle during their winter-quarters, but were continually exercised in such public and useful works as required a multitude of hands; by which discipline they became hardy, active, and less at leisure to mutiny, or corrupt one another. I do not affirm that this answers all submerged trees, but of very many imputed to other causes.

But we shall enquire farther concerning these subterranean productions anon, and whether the earth, as well as the water, have not the virtue of strange transmutations. These trees are found in moors by poking with staves of three or four feet long shod with iron.

13. In Scotland many submerged Oaks are found near the river Nefs; and, as we noted, there is a most beautiful sort of Fir or rather Pine, bearing small sharp cones, (some think it the Spanish Pinafter) growing upon the mountains; of which, from the late Marquis of Argyle, I had some seeds sent me, which I have sown with tolerable success; and I prefer them before any other, because they grow both very erect, and, fixing themselves stoutly, need little or no support. Near Lochbroom, betwixt the loch and an hill, they grow in such quantity, that, from the spontaneous fall, ruin and decay of the trees lying cross one another to a man's height, partly covered with moss, and partly earth and grass, which rots, fills up, and grows again, a considerable hill has, in process of time, been raised to almost their very tops, which, being an accident of singular remark, I thought fit to mention. Both Fir and Pine (sociable trees) planted pretty near together, shred and clipt at proper seasons, make stately, noble, and very beautiful skreens and fences to protect Orange, Myrtle, and other curious greens, from the scorching of the sun and ruffling winds, preferable to walls. See how to be planted and cultivated, with the dimensions of a skreen, in the rules for the defence of gardens, annexed to *De la Quintin*, N°. XV. by Mr. London and Mr. Wise. In the mean time, none of these sorts are to be mingled in taller woods or copses, in which they starve one another, and lose their beauty. And now those who would see what Scotland produces, (of innumerable trees of this kind) should consult the learned Sir Robert Sibbald.

14. For the many and almost universal use of these trees both sea and land will plead,

—————dant utile lignum

Navigiis Pinos—————

GEORG. ii.

The useful Pine for ships—————

Hence Papinius VI. Thebaid. calls it *Audax Abies*. They make our best mast, sheathing, scaffold poles, &c. heretofore the whole vessel. It is pretty, saith Pliny, to consider that those trees, which are so much sought after for ship-

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ping, should most delight in the highest of mountains, as if they fled from the sea on purpose, and were afraid to descend into the waters. With Fir we likewise make all intestine works, as wainscot, floors, pales, balks, laths, boxes, bellies for all musical instruments in general, nay, the ribs and sides of that enormous stratagem, the so famous Trojan Horse *, may be thought to be built of this material; and, if the Poet mistake not,

* Macrob.
Sat. vi. cap.
ix.

—————Sæctaque intexunt Abiete costas.

JEN. iii.

—————The ribs with deal they fit.

There being no material more obedient and ready to bend for such works.

In Holland they receive their best masts out of Norway, and even as far as Muscovy, which are best esteemed, as consisting of long fibres without knots, but deal boards from the first; and though Fir rots quickly in salt water, it does not so soon perish in fresh; nor do they yet refuse it in merchant-ships, especially the upper parts of them, because of its lightness. The true Pine was ever highly commended by the antients for naval architecture, as not so easily decaying; and we read that Trajan caused vessels to be built both of the true and spurious kind, well pitched, and overlaid with lead, which perhaps might hint our modern sheathing with that metal at present. Fir is exceeding smooth to polish on, and therefore does well under gilding work, and takes black equal with the Pear-tree. Both Fir, and especially Pine, succeed well in carving, as for capitals, festoons, nay statues, especially being gilded, because of the easiness of the grain to work, and take the tool every way; and he that shall examine it nearly will find that famous image of the blessed Virgin at Loretto (reported to be carved by the hands of St. Luke) to be made of Fir, as the grain easily discovers it. The Torulus, as Vitruvius terms it, and heart of deal, kept dry, rejecting the albumen and white, is everlasting; nor does there any wood so well agree with the glew as it, or is so easy to be wrought. It is also excellent for beams, and other timber-work in houses, being both light and exceedingly strong, and therefore of very good use for bars and bolts of doors, as well as for doors themselves, and for the beams of coaches; a board of an inch and half thick will carry the body of a coach with great ease, by reason of a natural spring which it has, not easily violated. You shall find that of old they used it for carts and other carriages, also for piles to superstruct on in boggy grounds. Most of Venice and

Amsterdam is built upon them, with so excessive charge, that the foundations of their houses, as some report, cost as much as what is erected on them, there being driven in no fewer than thirteen thousand six hundred and fifty-nine great masts of this timber under the new Stadt-house of Amsterdam. For scaffolding also there is none comparable to it; and I am sure we find it an extraordinary savor of Oak, where it may be had at a reasonable price. I will not complain what an incredible mass of ready money is yearly exported into the northern countries for this sole commodity, which might all be saved were we industrious at home, or could have it out of Virginia, there being no country in the whole world stored with better; besides another sort of wood, which they call Cypress, much exceeding either Fir or Pine for this purpose, being as tough and springy as Yew, and bending to admiration; it is also lighter than either, and everlasting in wet or dry; so as I much wonder that we enquire no more after it. In a word, not only here and there an house, but whole towns and great cities are and have been built of Fir only; nor that alone in the north, as Moscow, &c. where the very streets are paved with it, (the bodies of the trees lying prostrate one by one in manner of a raft) but the renowned city of Constantinople; and, nearer home, Thoulouse in France was, within little more than an hundred years, most of Fir, which is now wholly marble and brick, after eight hundred houses had been burnt, as it often happens at Constantinople—a place where no accident even of this devouring nature will at all move them to re-edify with more lasting materials. To conclude with the uses of Fir, we have most of our pot-ashes of this wood, together with the torch, or funeral staves; nay, and of old, spears of it, if we may credit Virgil's Amazonian Combat.

Cujus apertum
Adversî longâ tranſverberat abiete pectus.

ÆN. xi.

She preſt
A long Fir ſpear through his expoſed breaſt.

Laſtly, The very chips or ſhavings of deal boards are of other uſe than to kindle fires alone. Thomas Bartholinus, in his *Medicina Danorum*, Diſſert. vii. where he diſclaims the uſe of hops in beer as pernicious and malignant, and from ſeveral inſtances how apt it is to produce and uſher in infections, nay plagues, &c. would ſubſtitute in its place the ſhavings of deal boards, as he affirms, to give a grateful odour to the drink;

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and how sovereign those resinous woods, the tops of Fir and Pines, are against the scorbout, gravel in the kidneys, &c. we generally find. It is in the same chapter that he commends also Wormwood, Marrubium, Chamae-læagnum, Sage, Tamarisk, and almost any thing rather than hops. The bark of the Pine heals ulcers; and the inner rind cut small, confused, and boiled in store of water, is an excellent remedy for burns and scalds; washing the sore with the decoction, and applying the softened bark. It is also sovereign against frozen and benumbed limbs. The distilled water of the green cones takes away the wrinkles of the face; dipping cloths therein, and laying them on it, becomes a cosmetic not to be despised. The Pine; or Picea, buried in the earth, never decays. From the latter transudes a very bright and pellucid gum; hence we have likewise rosin. Also of the Pine are made boxes and barrels for dry goods; yea, and it is cloven into (scandulæ) shingles for the covering of houses in some places; also hoops for wine vessels, especially of the easily flexible wild Pine; not to forget the kernels, (this tree being always furnished with cones, some ripe, others green) of such admirable use in emulsions; and for tooth-pickers, even the very leaves are commended. In sum, they are plantations which exceedingly improve the air by their odoriferous and balsamical emissions, and for ornament create a perpetual spring where they are plentifully propagated. And if it could be proved that the Almug-trees*, recorded 1 Reg. x. 12, (whereof pillars for that famous temple and the royal palace, harps and psalteries, &c. were made) were of this sort of wood, as some doubt not to assert, we should esteem it at another rate; yet we know Josephus affirms they were a kind of Pine-tree, though somewhat resembling the Fig-tree wood to appearance, as of a most lustrous candor. In 2 Chron. ii. 8, there is mention of Almug-trees growing in Lebanon; and if so, methinks it should rather be, as Buxtorf thinks, a kind of Cedar, (yet we find Fir also in the same period) for we have seen a whiter sort of it, even very white as well as red; though some affirm it to be but the sap of it, as our cabinet-makers call it: I say there were both Fir and Pine-trees growing upon those mountains; and the learned Meibomius, in that curious treatise of his, *De Fabrica Trirremium*, shews that there were such trees brought out of India, or Ophir. In the mean time, Mr. Purchas informs us that Dr. Dee writ a laborious treatise almost wholly on this subject, but I could never have the good hap to see it, wherein, as Commissioner for Solomon's timber, and like a learned Architect and Planter, he has summoned a jury of twelve sorts of trees; namely, 1. the Fir; 2. Box; 3. Cedar; 4. Cypress; 5. Ebony; 6. Ash; 7. Jun-

* Where the
LXX (viz.
3 Kings x. 12)
calls it *amih-
uwa non dedo-
lata*; others
*ligna undula-
ta*.

per; 8. Larch; 9. Olive; 10. Pine; 11. Oak; 12. Sandal-trees, to examine which of them were this Almugim, and at last seems to concur with Josephus in favour of Pine or Fir; who possibly, from some antient record, or fragment of the wood itself, might learn something of it; and it is believed that it was some material both odoriferous to the scent, and beautiful to the eye, and of fittest temper to refract sounds, besides its serviceableness for building; all which properties are in the best sort of Pine, or Thyina, as Pliny calls it; or perhaps some other rare wood, of which the Eastern Indies are doubtless the best provided; and yet I find that those vast beams which sustained the roof of St. Peter's church at Rome, laid, as reported, by Constantine the Great, were made of the Pitch-tree, and have lasted from anno 336, down to our days, above one thousand three hundred years.

15. But now whilst I am reciting the uses of these beneficial trees, Mr. Winthorp presents the Royal Society with the process of making tar and pitch in New-England, which we thus abbreviate. Tar is made out of that sort of Pine-tree from which naturally turpentine exsilleth; and which, at its first flowing out, is liquid and clear; but, being hardened by the air, either on the tree, or wherever it falls, is not much unlike the Burgundy pitch; and we call them Pitch-pines out of which this gummy substance transudes. They grow upon the most barren plains, on rocks also, and hills rising amongst those plains, where several are found blown down, and have lain so many ages, as that the whole bodies, branches, and roots of the trees being perished, some certain knots only of the boughs have been left remaining entire, (these knots are that part where the bough is joined to the body of the tree) lying at the same distance and posture as they grew upon the tree for its whole length. The bodies of some of these trees are not corrupted through age, but quite consumed and reduced to ashes by the annual burnings of the Indians when they set their grounds on fire, which yet has, it seems, no power over these hard knots beyond a black scorching, although, being laid on heaps, they are apt enough to burn. It is of these knots they make their tar in New-England and the country adjacent, whilst they are well impregnated with that terebinthine and resinous matter, which, like a balsam, preserves them so long from putrefaction. The rest of the tree does indeed contain the like terebinthine sap, as appears, upon any slight incision of the bark on the stem or boughs, by a small crystalline pearl which will sweat out; but this, for being more watery and indigested,

See Plin.
Hist. Nat. lib.
xvi. cap. xi.
or rather The-
ophrastus Hist.
lib. ix. cap. ii.
iii. & lib. xiv.
cap. xx. lib.
xxiii. cap. i.
lib. xxiv. cap.
vi.

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by reason of the porosity of the wood, which exposes it to the impressions of the air and wet, renders the tree more obnoxious, especially if it lie prostrate with the bark on, which is a receptacle for a certain intercutaneous worm that accelerates its decay. They are the knots then alone which the tar-makers amass in heaps, carrying them in carts to some convenient place not far off, where, finding clay or loam fit for their turn, they lay an hearth of such ordinary stone as they have at hand: This they build to such an height from the level of the ground, that a vessel may stand a little lower than the hearth to receive the tar as it runs out. But first the hearth is made wide, according to the quantity of knots to be set at once, and that with a very smooth floor of clay, yet somewhat descending, or dripping from the extrem parts to the middle, and thence towards one of the sides, where a gullet is left for the tar to run out at. The hearth thus finished, they pile the knots one upon another, after the very same manner as our colliers do their wood for charcoal, and of a height proportionable to the breadth of the hearth, and then cover them over with a coat of loam or clay, which is best, or, in defect of those, with the best and most tenacious earth the place will afford, leaving only a small spiracle at the top, whereat to put the fire in, and making some little holes round about, at several heights, for the admission of so much air as is requisite to keep it burning, and to regulate the fire by opening and stopping them at pleasure. The process is almost the same with that of making charcoal; for, when it is well on fire, the middle hole is also stopped, and the rest of the registers so governed as the knots may keep burning, and not be suffocated with too much smoak, whilst, all being now thorough-heated, the tar runs down to the hearth, together with some of the more watery sap, which, hastening from all parts towards the middle, is conveyed by the forementioned gutter into the barrel or vessel placed to receive it. Thus the whole art of tar-making is no other than a kind of rude distillation *per descensum*, and might therefore be as well done in furnaces of large capacity, were it worth the expence. When the tar is now all melted out and run, they stop up all the vents very close, and afterwards find the knots made into excellent charcoal, preferred by the smiths before any other whatsoever which is made of wood, and nothing so apt to burn out when their blast ceaseth; neither do they sparkle in the fire as many other sorts of coal do; so as, in defect of sea-coal, they make choice of this as best for their use, and give greater prices for it. Of these knots likewise do the planters split out small slivers about the thickness of one's finger, or somewhat thinner,

which serve them to burn instead of candles, giving a very good light. This they call candle-wood, and it is in much use, both in New-England, Virginia, and amongst the Dutch planters in their villages; but for that it is something offensive, by reason of the much fuliginous smoak which comes from it: They commonly burn it in the chimney corner, upon a flat stone or iron, except, occasionally, they carry a single stick in their hand as there is need of light to go about the house. It must not be conceived, by what we have mentioned in the former description of the knots, that they are only to be separated from the bodies of the trees by devouring time, or that they are the only materials out of which tar can be extracted; for there are in these tracts millions of trees which abound with the same sort of knots, and full of turpentine fit to make tar: But the labour of felling these trees, and of cutting out their knots, would far exceed the value of the tar, especially in countries where workmen are so very dear: But those knots above-mentioned are provided to hand, without any other labour than the gathering only. There are sometimes found of those sort of Pine-trees, the lowest part of whose stems towards the root is as full of turpentine as the knots; and of these also may tar be made. But such trees being rarely found, are commonly preserved to split into candle-wood, because they will be easily riven out into any lengths and scantlings desired, much better than the knots. There be, who pretend an art of as fully impregnating the body of any living Pine-tree, for six or eight feet high; and some have reported that such an art is practised in Norway. But, upon several experiments, by girdling the tree, as they call it, and cutting some of the bark round, and a little into the wood of the tree, six or eight feet distant from the ground, it has never yet succeeded. Whether the just season of the year was not observed, or what else omitted, were worth the disquisition, if at least there be any such secret amongst the Norwegians, Swedes, or any other nation. Of tar, by boiling it to a sufficient height, is pitch made; and in some places where rosin is plentiful, a fit proportion of that may be dissolved in the tar whilst it is boiling, and this mixture is soonest converted to pitch; but it is of somewhat a differing kind from that which is made of tar only, without other composition. There is a way which some ship-carpenters in those countries have used, to bring their tar into pitch for any sudden use, by making the tar so very hot in an iron kettle, that it will easily take fire, which, when blazing, and set in an airy place, they let burn so long, till, by taking out some small quantity for trial, being cold, it appears of a sufficient consistence: Then by covering the kettle close,

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the fire is extinguished, and the pitch is made without more ceremony. There is a process of making rosin also out of the same knots, by splitting them out into thin pieces, and then boiling them in water, which will educe all the resinous matter, and gather it into a body, which, when cold, will harden into pure rosin. It is moreover to be understood, that the Fir, and most coniferous trees, yield the same concretes, lachrymæ, turpentine, rosins, hard, naval or stone, and liquid pitch, and tar for a remedy against arthritic and pulmonic affections: These the Chururgeon uses in plaisters—and they are applied to mechanic, and other innumerable purposes. From their fuliginous vapour raised by burning, especially the rosin, we have our lamp and printers' black. I am persuaded the Pine, Pitch, and Fir-trees in Scotland might yield his Majesty plenty of excellent tar, was some industrious person employed about the work, so as I wonder it has been so long neglected. But there is another process, not much unlike the former, which is given us by Joseph Georgi-renes, the present Archbishop of Samos, in his description of that, and other islands of the Ægean.

Their way of making pitch, says he, is thus: They take sapines, that is, that part of the Fir so far as it hath no knots; and, shaving away the extremities, leave only that which is nearest to the middle, and the pith: That which remains they call *Dadi*, from the old Greek word *Δάδες*, whence the Latin, *Teda*. These they split into small pieces, and, laying them on a furnace, put fire to the upper part till they are all burnt, the liquor in the mean time running from the wood, and let out from the bottom of the furnace into a hole made in the ground, where it continues like oil: Then they put fire to it, and stir it about till it thicken and has a consistence: After this, putting out the fire, they cast chalk upon it, and draw it out with a vessel, and lay it in places cut out of the ground, where it receives both its form and a firmer body for easy transportation. Thus far the Archbishop; but it is not so instructive and methodical as what we have described above.

Other processes for extracting of these substances may be seen in Mr. Ray's History of Plants, already mentioned, lib. xxix. cap. i. And as to pitch and tar, how they make it near Marseilles, in France, from the Pines growing about that city, see Philosophical Transactions, N^o. 243, p. 291, anno 1696, very well worthy the transcribing, if what is mentioned in this chapter were at all defective.

I had, in the former editions of *Silva*, placed the *Larix* among the trees which shed their leaves in winter, as indeed does this, but not before there is an almost immediate supply of fresh; and may therefore, both for its similitude, stature, and productions, challenge rank among the coniferous. We raise it of seeds, and it grows spontaneously in Stiria, Carinthia, and other Alpine countries. The change of the colour of the old leaf made an ignorant gardener of mine eradicate what I had brought up with much care, as dead: Let this therefore be a warning. The leaves are thin, pretty long and bristly; the cones small, grow irregular, as do the branches, like the Cypress, a very beautiful tree, the ponderous branches bending a little, which makes it differ from the Libanus Cedar, to which some would have it allied; nor are any found in Syria. Of the deep-wounded bark exudes the purest of our shop-turpentine, (at least as reputed) as also the drug agaric. That it flourishes with us, a tree of good stature, not long since to be seen about Chelmsford in Essex, sufficiently reproaches our not cultivating so useful a material for many purposes, where lasting and substantial timber is required: For we read of beams of no less than an hundred and twenty feet in length, made out of this goodly tree, which is of so strange a composition that it will hardly burn: *Et robusta Larix igni impenetrabile lignum*; for so Cæsar found it in a castle he besieged, built of it. The story is recited at large by Vitruvius, lib. ii. cap. ix; but see what Philander says upon the place, on his own experience. Yet the coals thereof were held far better than any other for the melting of iron, and the lock-smith; and, to say the truth, we find they burn it frequently as common fuel in the Valtoline, if at least it be the true *Larix*, which they now call *Melere*. There is abundance of this Larch timber in the buildings at Venice, especially about the palaces in Piazza San Marco, where I remember Scamozzi says he himself used much of it, and infinitely commends it. Nor did they only use it in houses, but in naval architecture also. The ship mentioned by Witsén (a late Dutch writer of that useful art) to have been found not long since in the Numidian sea, twelve fathoms under water, was chiefly built of this timber and Cypress, both reduced to that induration and hardness, as greatly to resist the fire and the sharpest tool; nor was any thing perished of it, tho' it had lain above a thousand and four hundred years submerged. The decks were covered with linen and plates of lead, fixed with nails gilt; and the entire ship, which contained thirty feet in length, so staunch, as not one drop of water had soaked into any room. Tiberius, we find, built that famous bridge to his Naumachia

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with this wood; and it seems to excel for beams, doors, windows, and masts of ships; resists the worm. Being driven into the ground, it is almost petrified, and will support an incredible weight; which, and for its property of long resisting fire, makes Vitruvius with they had greater plenty of it at Rome to make joists of, where the Forum of Augustus was (it seems) built of it, and divers bridges by Tiberius; for that, being attempted with fire, it is long in taking hold; growing only black without. And the timber of it is so exceedingly transparent, that cabbins being made of the thin boards, when in the dark night they have lighted candles in them, people who are at a distance without doors would imagine the whole room to be on fire, which is pretty odd, considering there is no material so (as they pretend) unapt to kindle. The *Larix* bears polishing excellently well, and the turners abroad much desire it. Vitruvius says, it is so ponderous that it will sink in water. It makes everlasting spouts, pent-houses, and featheridge, which need neither pitch or painting to preserve them; also excellent pales, posts, rails, pediments, and props for vines. To these add the palates on which our painters separate and blend their colours. Before the use of canvas and bed-tick, it formed the tables on which the great Raphael and the famous artists of the last age eternized their skill.*.

NOTES.

* The wood of the Larch-tree being extremely solid, it admits of a fine polish or smooth firmness, which contributes to throw forth the colouring with uncommon lustre:

— Annis non expugnabile lignum: —

Illustrat pictoris opus. —

It is likewise thought to be inaccessible to the attacks of worms; on which account, as well as not being liable to warp when sawn and well seasoned, the modern Italians use it for back-boards to place behind fine drawings when they frame and glaze them; as also for picture-frames, because no other wood gives gilding such force, brightness, and, as it were, a sort of natural burnish; and this is the grand secret why Italian gilding on wood is so much better than ours, which has often a tarnished spongy cast, and looks like gilt gingerbread.



The Mulberry Tree.

Published Jan^y 1776 by A. Hunter M.D. as the Act directs

John Miller del. et sculp.

CHAP. II.

The MULBERRY.*

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MORUS, the Mulberry. It may possibly be wondered by some why we should insert this tree amongst our forest inhabitants; but we shall soon reconcile our industrious planter when he comes to understand the incomparable benefit of it, and that for its timber, durableness, and use for the joiner and carpenter, and to make hoops, bows, wheels, and even ribs for small vessels, instead of Oak, &c. though the fruit and the leaves had not the due value with us, which they deservedly enjoy in other places of the world.

2. But it is not here I would recommend our ordinary black-fruit bearer, though that be likewise worth the propagation, but that kind which is called the White Mulberry, which I have had sent me out of Languedoc; one of a broad leaf, found there and in Provence, whose seeds being procured from Paris, where they have it from Avignon, should be thus treated in the seminary.

NOTES.

* Of this genus there are six species.

1. MORUS (*Nigra*) foliis cordatis scabris. Hort. Cliff. 441. *Mulberry with rough heart-shaped leaves.* Morus fructu nigro. C. B. P. 459. *Mulberry with a black fruit. The common Mulberry.*

This is the common Black Mulberry-tree, which is cultivated for the delicacy of its fruit. It grows naturally in Persia, from whence it was first brought to the southern parts of Europe, but is now become common in every part of Europe where the winters are not very severe; for in the northern parts of Sweden these trees will not live in the open air; and in several parts of Germany they are planted against walls, and treated in the same way as the Peach, and other tender fruits, in this country.

2. MORUS (*Rubra*) foliis cordatis subtus villosis, amentis cylindricis. Lin. Sp. Plant. 1399. *Mulberry with heart-shaped leaves which are hairy on their under side, and cylindrical katkins.* Morus Virginienfis arbor, loti arboris instar ramosa, foliis amplissimis. Pluk. Phyt. tab. 246. *Virginia Mulberry branching like the Nettle-tree, having very large leaves.*

This tree will grow to the height of thirty or forty feet. It sends forth many large branches; and the bark of the young shoots is of a blackish colour. The leaves

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3. In countries where they cultivate them for the silk-worm and other uses, they sow the perfectly mature berries of a tree, whose leaves have not been gathered. These they shake down upon an old sheet spread under the tree, to protect them from gravel and ordure, which will hinder you from discerning the seed. If they be not ripe, lay them to mature upon shelves, but by no means till they corrupt; to prevent which, turn them daily; then put them in a fine sieve, and plunging them in water, bruise them with your hand: Do this in several waters, then change them in other clear water, and the seed will sink to the bottom, whilst the pulp swims, and must be taken off carefully. This done, lay them to

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are larger than the common Mulberry, and rougher, though in other respects they somewhat resemble them. It produces plenty of katkins, in shape like those of the Birch-tree; and the female flowers are succeeded by a dark reddish fruit. This is a very scarce plant at present, notwithstanding it bears the severity of our climate extremely well.

3. MORUS (*Alba*) foliis obliquo cordatis laevibus. Hort. Cliff. 441. *Mulberry with oblique, smooth, heart-shaped leaves. Morus fructu albo. C. B. P. 459. Mulberry with a white fruit.*

This tree will grow to a large size, and is very proper for walks and avenues, or for clumps or standards, either in fields or parks. The leaves are of a clear light green, and the fruit is of a paler colour than any of the other sorts, which makes it take the name of the White Mulberry. This tree possesses the peculiar property of breeding no vermin, either when growing or cut down; neither does it harbour any caterpillar, the silk-worm excepted. This species is cultivated for its leaves in France and Italy to feed silk-worms; and, when raised for that use, the tree should not be suffered to grow tall. The leaves should be torn off together with the tender twigs, which injures the plant much less than pulling them by the hand. This kind should be raised from seeds procured from the south of France or Italy: For which consult the notes upon p. 49.

4. MORUS (*Tinctoria*) foliis obliquo cordatis acuminatis hirsutis. *Mulberry with oblique, heart-shaped, acute-pointed, hairy leaves. Morus fructu viridi, ligno sulphureo tinctorio. Sloan. Hist. Jam. 2. p. 3. Mulberry with a green fruit, whose wood dyes a sulphur colour. Fustick wood.*

This tree is better known by the title of Fustick, which is given to the wood, than by its fruit, which is of no estimation. It grows naturally in most of the islands in the West-Indies, but more plentifully at Campeachy, where it abounds greatly. This wood is one of the commodities exported from Jamaica, where it grows in greater plenty than in any other of the British islands.—This tree, in the countries where it grows naturally, rises to the height of sixty feet or upward.

dry in the sun upon a linen cloth, for which one hour is sufficient, then fan and sift it from the husks, and reserve it till the season. This is the process of curious persons; but the sowing of ripe Mulberries themselves is altogether as good; and from the excrement of hogs, and even dogs, that will frequently eat them, they will rise abundantly. Note, that in sowing of the berry, it is good to squash and bruise them with fine sifted mould; and if it be rich, and of the old bed, so much the better. They should be interred, well moistened, and covered with straw, and then rarely watered till they peep; or you may squeeze the ripe berries in ropes of hair or baste, and bury them, as is prescribed for Hips and Haws.

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The bark is of a light brown colour, with some shallow furrows. The wood is firm, solid, and of a bright yellow. It sends out many branches on every side, covered with a white bark, and garnished with leaves about four inches long, which are broad at their base, and indented at the foot-stalk, where they are rounded; but one side is broader than the other, so that they are oblique to the foot-stalk; these diminish gradually, and end in acute points; they are rough like those of the common Mulberry, of a dark green, and stand upon short foot-stalks. Toward the end of the young branches come out short katkins of a pale herbaceous colour; and in other parts of the same branches the fruit is produced, growing upon short foot-stalks. The fruit is as large as a nutmeg, of a roundish form, full of protuberances like the common Mulberry, green within and on the outside, and of a luscious sweet taste when ripe.—This species is too tender to thrive in this country, unless preserved in a warm stove. There are several of the plants now growing in the Chelsea garden, which were raised from seeds sent from Jamaica by William Williams, Esq; with many other curious sorts, which are natives of that island. The seeds of this plant come up freely on a hot-bed; and when the plants are fit to remove, they should be each planted in a separate small pot filled with fresh light earth, and plunged into a hot-bed of tanners' bark, and shaded from the sun till they have taken new root. Let them be treated in the same way as other plants from those hot countries, always keeping them in the tan-bed in the stove, where they will make good progress. These plants retain their leaves great part of the year in the stove.

5. MORUS (*Papyrifera*) foliis palmatis, fructibus hispidis. Lin. Sp. Plant. 1399. *Mulberry with hand-shaped leaves and prickly fruit.* Morus fativa, foliis urticæ mortuæ, cortice papyrifera. Kæmp. Amœn. 471. *Cultivated Mulberry, with leaves like the Dead Nettle, and of whose bark paper is made.*

This sort grows naturally in China and Japan, where the inhabitants make paper of the bark. They cultivate the trees for that purpose on the hills and mountains, much after the same manner as Osiers are cultivated here, cutting down the young shoots in autumn for their bark. A few years ago there were several of

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The earth in which you sow them should be fine mould, and as rich as for Melons, raised a little higher than the area, as they make the beds for ordinary pot-herbs, to keep them loose and warm; and in such beds you may sow seeds as you do purslane, mingled with some fine earth, and thinly covered, and then for a fortnight strewed over with straw to protect them both from sudden heat and from birds. The season is April or May, though some forbear even till July and August, and in the second quarter of the moon, the weather calm and serene. At the beginning, keep them moderately fresh, not over wet, and clean weeded, secured from the rigour of frosts. The second year of their growth, about the beginning of October, or early spring, draw them gently out, prune the roots, and, dipping them a little in pond-water, transplant them in a warm place or nursery. It is best ranging them in drills two feet large and one in depth, each drill three feet distant, and each plant two; and if thus the new earth be somewhat lower than the surface of the rest, it will the better receive the rain. Being planted, cut them all within three inches of the ground.

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these trees raised in the gardens of his Grace the Duke of Northumberland from seed; and, when removed into the open air, bore the weather without shelter. This plant makes very strong vigorous shoots, but seems not to be of tall growth, for it sends out many lateral branches from the root upward. The leaves are large, some of them are entire, others are deeply cut into three, and some into five lobes, especially while the trees are young, dividing in form of a hand. They are of a dark green, and rough to the touch, but of a pale green, and somewhat hairy on their under side, falling off on the first approach of frost in autumn, as do those of the common Mulberry. The description which Kämpfer gives of the fruit is, that they are a little larger than pease, surrounded with long purple hairs, are composed of acini or protuberances, and, when ripe, change to a black purple colour, and are full of sweet juice.

6. *MORUS (Indica) foliis ovato-oblongis utrinque æqualibus, inæqualiter serratis.* Flor. Zeyl. 337. *Mulberry with oval oblong leaves, which are equal on both sides, but unequally sawed.* Tinda-parua Hort. Mal.

This kind grows naturally in India, where it becomes a large tree. It hath a soft, thick, yellowish bark, with a milky juice like the Fig, which is astringent. The branches come out on every side, and are garnished with oblong oval leaves, standing upon short foot-stalks. Both sides of these leaves are equal, but their edges are unequally sawed. They are rough, of a dark green on their upper side, but pale on their under, standing alternately on the branches. The flowers come out in round heads at the foot-stalks of the leaves on each side the branches; they are of an herbaceous white colour; the male flowers have four stamina;

Water them not in winter but in extream necessity, and when the weather is warm, and then do it in the morning. In this cold season you will do well to cover the ground with the leaves of trees, straw, or short litter, to keep them warm; and every year you should give them three dressings or half-diggings, viz. in April, June, and August; this, for the first year, still after rain. The second spring after transplanting, purge them of all superfluous shoots and cions, reserving only the most towardly for the future stem: This to be done yearly as long as they continue in the nursery; and if, of the principal stem so left, the frost mortify any

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the female flowers are succeeded by roundish fruit, which are first green, afterwards white, and when ripe turn to a dark red colour.—The plants are too tender to live out of a stove in this country.

The Mulberry is of the class and order *Monocia Tetrandria*, which contains those plants that have male and female flowers at separate distances upon the same plant, the male flowers having four stamina.

It is generally observed that the old Mulberry-trees are not only more fruitful than the young, but their fruit is much larger and better flavoured; so that where there are any of these old trees, it is the best way to propagate from them, and to make choice of those branches which are most fruitful. The usual method of propagating these trees, is by laying down their branches; which will take root in one year, and are then separated from the old trees; but as the most fruitful branches are often so far from the ground as not to be layed, unless by raising of boxes or baskets of earth upon supports for this purpose, so the better way is to propagate them by cuttings, which, if rightly chosen and skilfully managed, will generally succeed: And in this method there will be no difficulty in having them from trees at a distance, and from the most fruitful branches. These cuttings should be the shoots of the former year, with one joint of the two years wood to their bottom; the cuttings should not be shortened, but planted their full length, leaving two or three buds above ground. The best season for planting them is in March, after the danger of hard frosts is over. They should be planted in light rich earth, pressing the ground pretty close about them; and if they are covered with glasses, it will forward their putting out roots; but where there is not such conveniency, the ground about them should be covered with moss to prevent its drying; and where this is carefully done, the cuttings will require but little water. If the cuttings succeed well, and make good shoots, they may be transplanted the following spring into the nursery, where they should be regularly trained to stems by fixing down stakes, to which the principal shoots should be fastened; and most of the lateral branches should be closely pruned off, leaving only two or three of the weakest to detain the sap, for the augmentation of the stem; for when they are quite divested of their side-shoots, the sap is mounted to the top, so that the heads

Book II. part, cut it off, and continue this government till they are near six feet high; after which suffer them to spread into heads, by discreetly pruning and fashioning them: But if you plant where cattle may endanger them, the stem had need be taller, for they are extremely liquorish of the leaves.

4. When they are about five years growth you may transplant them without cutting the root, provided you eradicate them with care, only trimming the head a little. The season is from September to November

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of the trees grow too fast for the stems, and become too weighty for their support. After four years growing in the nursery they will be fit to transplant where they are to remain; for these trees are transplanted with greater safety while young, than when they are of a large size.

If the cuttings are planted in a bed fully exposed to the sun, it will be proper to arch the bed over with hoops, that they may be shaded with mats in the heat of the day during the spring, till they have put out roots; after which, the more they are exposed to the sun, the better they will succeed, provided the ground is covered with moss or mulch to prevent its drying; for the sun will harden the shoots, whereby the plants will be in less danger of suffering by the early frosts in autumn; for when these are in a shady situation, they are apt to grow vigorously in summer; and, being replete with moisture, the early frosts in October frequently kill their tops. If the following winter proves severe, they are often killed to their roots, and sometimes are entirely destroyed. Mr. Miller recommends the cuttings to be planted on a hot-bed; and he informs us that he was led to this improvement by observing some sticks of Mulberry-trees which were cut for forks, and thrust into the hot-bed to fasten down the vines of cucumbers; which, although they had been cut from the tree a considerable time, yet many of them put out roots and shot out branches; so that when any person is in haste to propagate these trees, if the cuttings are planted on a moderate hot-bed, they will take root much sooner than in the common ground.

This tree delights to grow in a light rich earth, such as is in most of the old kitchen gardens about London; for in some of those gardens there are trees of a very great age, which are very healthy and fruitful, and their fruit is larger and better flavoured than that of younger trees. I have never yet seen any of these trees which were planted in a very stiff soil, or on shallow ground, either upon clay, chalk, or gravel, which have been healthy or fruitful; their stems and branches are generally covered with moss, so that the little fruit which they produce, is small, ill tasted, and late before it ripens.

If these trees are planted in a situation where they are defended from the strong south and north-west winds, it will preserve their fruit from being blown off; but this shelter, whether it be trees or buildings, should be at such a distance as not to keep off the sun; for where the fruit has not the benefit of his rays to dissipate the morning dews, it will turn mouldy and rot upon the trees.

in the new moon; and if the holes or pits you set them in were dug and prepared some months before, it would much secure their taking. Some cast horas, bones, shells, &c. into them, the better to loosen the earth, which should be rich, and well refreshed all summer. A light and dry mould is best, well exposed to the sun and air, which above all things this tree affects, and hates watery low grounds. In sum, being a very lasting tree, it thrives best where Vines prosper most, whose society it exceedingly cherishes; nor does it less delight to be amongst Corn, no way prejudicing it with its shade. The distance of these standards should be twenty or twenty-four feet every way, if you would design walks or groves of them; if the environs of fields, banks of rivers, highways, &c. twelve or fourteen feet may suffice, but the farther distant the better: The White spreads its roots much farther than the Black, and likes the valley more than the higher ground.

5. Another expedient to increase Mulberries, is by layers from the suckers at the foot; this should be done in spring, leaving not above two buds out of the earth, which you must diligently water, and the second year they will be rooted. They will also take by passing any branch, or arm, slit and kept a little open with a wedge, or stone, through a basket of earth, which is a very sure way. Nay, the very cuttings will strike in spring; but let them be from shoots of two years growth, with some of the old wood, though of seven or eight years; these set in rills, like vines, having two or three buds at the top, will root infallibly, especially if you twist the old wood a little, or at least hack it; though some slit the foot, inserting a stone, or grain of an oat to suckle and entertain the plant with moisture.

6. They may also be propagated by grafting them on the Black Mulberry in spring, or inoculated in July, taking the cions from some old tree that has broad, even, and round leaves, which causes it to produce very ample and tender leaves, of great emolument to the silk-master.

7. Some experienced husbandmen advise to poll our Mulberries every three or four years, as we do our Willows; others not till eight years; both erroneously. The best way is yearly to prune them of their dry and superfluous branches, and to form their heads round and natural. The first year of removal where they are to abide, cut off all the shoots to five or six of the most promising; the next year leave not above three of these,

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which dispose in triangle as near as may be, and then disturb them no more, unless it be to purge them (as we taught) of dead fear-wood and extravagant parts, which may impeach the rest; and if afterward any pruned branch shoot above three or four cions, reduce them to that number. One of the best ways of pruning, is what they practise in Sicily and Provence, to make the head hollow and like a bell, by cleansing them of their inmost branches; and this may be done either before they bud, viz. in the new moon of March, or when they are full of leaves in June or July, if the season prove any thing fresh. Here I must not omit what I read of the Chinese culture, and which they now also imitate in Virginia, where they have found a way to raise these plants of the seeds, which they mow and cut like a crop of grass, which sprout and bear leaves again in a few months. They likewise in Virginia have planted them in hedges, as near together as we do gooseberries and currants, for their more convenient clipping, which they pretend to do with scissors.

8. The Mulberry is much improved by stirring the mould at the root, and leration.

9. We have already mentioned some of the uses of this excellent tree, especially of the White, so called because the fruit is of a paler colour, which is also of a more luscious taste and lesser than the Black; the rind likewise is whiter, and the leaves of a mealy clear green colour, far tenderer, and sooner produced by at least a fortnight, which is a marvellous advantage to the newly-disclosed silk-worm; also they arrive sooner at their maturity; and the food produces a finer web. Nor is this tree less beautiful to the eye than the fairest Elm, very proper for walks and avenues. The timber, amongst other properties, will last in the water as well as the most solid Oak, and the bark makes good and tough bast ropes. It suffers no kind of vermin to breed on it, whether standing or felled, nor dare any caterpillar attack it, save the silk-worm only. The loppings are excellent fuel; but that for which this tree is in greatest and most worthy esteem, is for the leaves, which, besides the silk-worm, nourishes cows, sheep, and other cattle, especially young porkers, being boiled with a little bran. The fruit is excellent to feed poultry. In sum, whatever eats of them will with difficulty be reduced to endure any thing else, as long as they can come by them. To say nothing of their other sovereign qualities, as relaxing of the belly, being eaten in the morning, and curing inflammations and ulcers of the mouth and throat, mixed with

mel rosarum, in which receipt they do best when taken before they are over ripe. I have read that in Syria they make bread of them, but that the eating of it makes men bald. As for drink, the juice of the berry mixed with cyder-apples makes an excellent liquor both for colour and taste.

10. To proceed with the leaf, for which the Mulberry is chiefly cherished, the benefit of it is so great, that they are frequently let to farm for vast sums; so as one sole tree has yielded the proprietor a rent of twenty shillings per annum for the leaves only, and six or seven pounds of silk, worth as many pounds sterling, in five or six weeks, to those who kept the worms. We know that, till after Italy had made silk above a thousand years, they received it not in France, it being hardly yet an hundred since they betook themselves to this manufacture in Provence, Languedoc, Dauphine, Lionois, &c. and not in Orleanois till Henry the Fourth's time; but it is incredible what a revenue it now amounts to in that kingdom. About the same time, or a little after, it was that King James did, with extraordinary care, recommend it to this nation by a book of directions, acts of council, and all other princely assistance. But this did not take no more than that of Henry the Fourth's proposal about the environs of Paris, who filled the highways, parks, and gardens of France with the trees, beginning in his own gardens for encouragement. Yet I say this could not be brought into example till this present great Monarch, Lewis XIV. (by the indefatigable diligence of Monsieur Colbert, Superintendant of his Majesty's manufactures) so successfully revived it, that it is prodigious to consider what an happy progress they have made in it; to our shame be it spoken, who have no other discouragements from any insuperable difficulty whatever, but our sloth and want of industry; since wherever these trees will grow and prosper, the silk-worms will do so also; and they were likewise averse, and from the very same suggestions, where now that manufacture flourishes in our neighbour countries. It is demonstrable that Mulberries in four or five years may be made to spread all over this land; and when the indigent and young daughters in proud families are as willing to gain three or four shillings a day for gathering silk and busying themselves in this sweet and easy employment, as some do to get four pence a day for hard work at hemp, flax, and wool, the reputation of Mulberries will spread in England and other plantations. I might say something like this of Saffron, which

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we yet too much neglect the culture of; but which, for all this, I do not despair of seeing reassumed when that good genius returns *. In order to this hopeful prognostic, we will add a few directions about the gathering of the leaves, to render this chapter one of the most accomplished, for certainly one of the most accomplished and agreeable works in the world.

11. The leaves of the Mulberry should be collected from trees of seven or eight years old; if of such as are very young, it impairs their growth; neither are they so healthful for the worms, making them hydropical and apt to burst; as do also the leaves of such trees as be planted in a too waterish or over rich soil, or where no sun comes, and all sick and yellow leaves are hurtful. It is better to clip, and let the leaves fall upon a subtended sheet or blanket, than to gather them by hand; and to gather them, than to strip them, which mars and gauls the branches, and bruises the leaves that should hardly be touched. Some there are who lop off the boughs and make it their pruning; and it is a tolerable way, so it be discreetly done in the over thick parts of the tree; but these leaves, gathered from a separated branch, will die, and wither much sooner than those which are taken from the tree immediately, unless you set the stem in water. Leaves gathered from boughs cut off will shrink in three hours; whereas those you take from the living tree will last as many days; and, being thus a while kept, are better than over fresh ones. It is a rule never to gather in a rainy season, nor cut any branch whilst the wet is upon it; and therefore against such suspected times you are to provide before-hand, and to reserve them in some fresh but dry place. The same caution you must observe for the dew, though it do not rain, for wet food kills the worms. But if this cannot be altogether prevented, put the leaves be-

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* This seems a prophetic expression, as Saffron is now cultivated very largely at Saffron-Walden, in Essex. The English Saffron is greatly superior to that which grows in France or Spain. Its cultivation employs a number of women and children; and it were to be wished that every encouragement was given to the culture of such plants as employ the hands of the feeble poor. In this excellent chapter upon the Mulberry-tree, Mr. Evelyn endeavours to prove that Silk may be produced in this country to a great national advantage. The food of the Silk-worm certainly grows with great luxuriancy in every part of this island, and, from many accurate experiments made upon every branch of this business, we may venture to conclude that the manufacture of raw Silk may be successfully, and profitably, conducted in all the Southern Counties of Great-Britain.

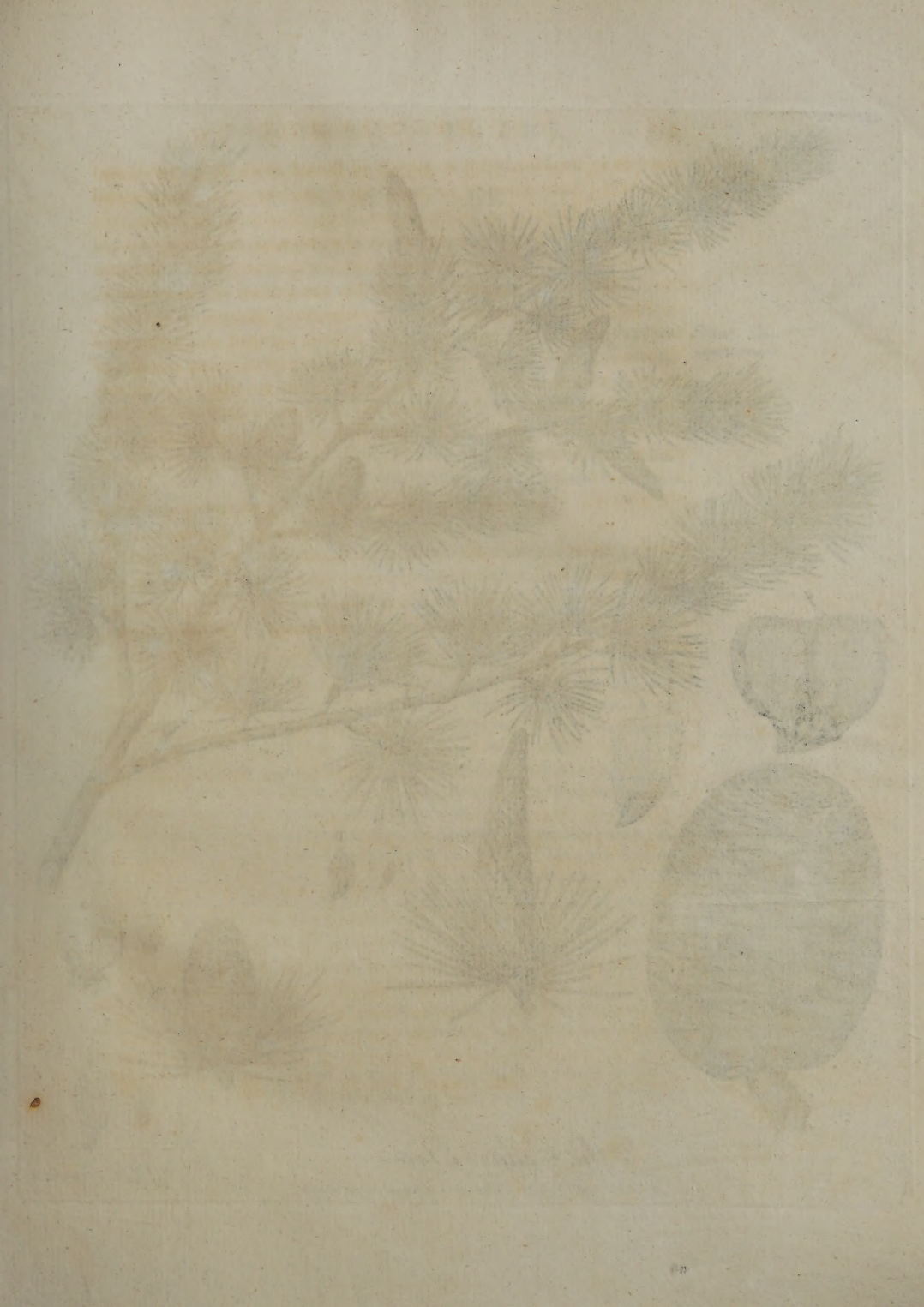
tween a pair of sheets well dried by the fire, and shake them up and down till the moisture be drunk up in the linen; and then spreading them to the air a little, on another dry cloth, you may feed with them boldly. The top-leaves and oldest should be gathered last of all, as being most proper to repast the worms with, towards their last change. The gatherer must be neat, have his hands clean and his breath sweet, and not poisoned with onions or tobacco, and be careful not to press the leaves, by crowding them into the bags or baskets. Lastly, That they gather only, unless in case of necessity, leaves from the present, not from the former year's sprigs or old wood, which are not only rude and harsh, but are annexed to stubbed stalks which injure the worms, and spoil the denudated branches. One note more let me add, That in first hatching, the eggs sometimes disclose earlier than there is provision for them on the tree, in which case the tender leaves of Lettuce, Dandelion, or Endive may supply the defect, so they feed not on them too long or over much, which gives them the lask.

12. This is what I thought fit to premonish concerning the gathering of the leaves of this tree for silk-worms, as I find it in Monsieur Isnard's Instructions, and that exact discourse of his published some years since, and dedicated to Monsieur Colbert, (who has, it seems, constituted this industrious and experienced person surveyor of this princely manufacture about Paris) and because the book itself is rare, and known by very few. I have no more to add but this for our encouragement, and to encounter the objections which may be suggested about the coldness and moisture of our country, that the spring is in Provence no less constant than is ours in England; that the colds at Paris are altogether as sharp; and that in May, when it has continued raining for nine-and-twenty days successively, Monsieur Isnard assures us he proceeded in his work without the least disaster; and in the year 1664 he presented the French King, his master, with a considerable quantity of better silks than Messina or Bononia could produce, which he sold raw at Lyons for a pistole the pound, when that of Avignon, Provence, and Dauphine produced little above half that price. But you are to receive the compleat history of the silk-worm from that incomparable treatise which the learned Malpighius has lately sent out of Italy, and dedicated to the Royal Society, as a specimen and noble effect of its universal correspondence and concernments for the improvement of useful knowledge. To this I add that beneficial passage of the learned Dr. Beal, communicated in the twelfth volume of the Philosophical Transactions, N°. 133, p. 816, where we find recommended the promotion of

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this tree in England, from its success in several northern countries, and even in the moist places of Ireland. He shows how it may be improved by grafting on the Fig, or the larger Black Mulberry on that of the smallest kind: Also of what request the Diamoron, or Guidenie, made of the juice of this fruit, was with the antients, with other excellent observations. What other incomparable remedies the fruit of this tree affords, see Pliny's Natural History, lib. xxiii. chap. vii. There is a Mulberry-tree brought from Virginia, not to be contemned, upon which they find silk-worms, which would exceed the silk of Persia itself, if the planters of nauseous tobacco did not hinder the culture. Sir Jo. Berkley, who was many years Governor of that ample colony, told me he presented the King (Charles II.) with as much silk made there as made his Majesty a compleat suit of apparel.

Lastly, Let it not seem altogether impertinent if I add one premonition to those less-experienced Gardeners, who frequently expose their Orange, and like tender furniture-trees of the green-house, too early: That the first leaves putting forth of this wise tree (*Sapientissima*, as Pliny calls it) is a more infallible note when those delicate plants may be safely brought out to the air, than any other prognostic or indication. For other species, vid. *Raii Dendr.* p. 12.





The Cedar Tree.

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J. Miller del. & Sculp.

C H A P. III.

The CEDAR*, JUNIPER, CYPRESS, SAVINE,
TAMARISK, and THUYA.

1. **B**UT now after all the beautiful and stately trees, clad in perpetual verdure, should I forget the CEDAR, which grows in all ex-
treams; in the moist Barbadoes, the hot Bermudas, (I speak of those trees so denominated) the cold New-England, even where the snows lie, as I am told, almost half the year; for so it does on the mountains of Libanus, from whence I have received cones and seeds of those few remaining trees. Why then should they not thrive in Old England? I know not, save for want of industry and trial.

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They grow in the bogs of America, and in the mountains of Asia, so as there is, it seems, no place or clime which affrights it. And I have frequently raised them from their seeds and berries, of which we have the very best in the world from the Summer-Islands, though now almost ex-

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* The Cedar of Lebanon is now classed with the Pines; and the other Cedars described by Mr. Evelyn, are classed with the Junipers. But as I did not choose to disturb the order of the chapters, I have reserved the description of the Cedar for this place. Linnæus calls it *Pinus foliis fasciculatis acutis*. Sp. Pl. 1420.

This tree is generally supposed to be an inhabitant of mount Libanus only, but it is now found upon mount Taurus, Amanus, &c; and, from its hardy nature, it is probable that it may easily be naturalized to any climate.

Having procured the cones, whether from the Levant or of our own growth, the seeds, a little before sowing, should be got out in this manner: Let a hole be bored with a passer exactly up the center of each cone, from the base to the apex; put them into a tub of water, where they may remain till the next day; then having a wooden peg, rather bigger than the passer, let it be thrust down the hole, and it will so divide the cones, that the different scales may be taken away, and the seeds picked out. In doing this, great care must be taken not to bruise or hurt the seeds, which will then be very tender.

The soil in which you sow these seeds should be rather of a sandy nature; or, for want of this, some mould taken fresh from a rich pasture, and sieved with a little drift sand, will serve the purpose.

Having the seeds ready, let them be sown about the middle of March in pots or boxes near half an inch deep. In about seven or eight weeks the plants will come

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haunted by the unaccountable negligence of the planters; as are likewise those of mount Libanus, by the wandering and barbarous Arabs. The Cedars we have from Jamaica are a spurious sort, and the wood so porous that wine will sink into it. On the contrary, that of Carolina is so firm and close, that barrels and other vessels preserve the strongest spirits in vigour. The New-England Cedar is a lofty grower, and produces into excellent timber, which, being sawed into planks, makes delicate floors. They shingle their houses also with it, and generally employ it in all their buildings. Why have we no more of it brought us, to raise, plant, and convert to the same uses? There is the Oxycedrus of Lycia, which the Architect Vitruvius describes to have its leaf like the Cypress;

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up, when they should be removed into the shade from the heat of the sun, where they may stand, but not under shelter, all the summer; during which time they should be kept clean of weeds, and watered now and then. In the winter season they must be removed into a warmer situation; or, if it is likely to prove very severe, they should be sheltered either by mats, or removed into the green-house, or covered with an hot-bed frame; for they are subject to lose their young tops at first by the severity of frosts.

In the beginning of April following, these plants may be pricked out, in beds, four inches asunder; and if the weather proves dry, they should be shaded and watered till they have taken root; after which they will want little shading and less watering. Indeed, nothing more is required than keeping them clean from weeds, and covering the ground so as to keep it moist, and prevent its chapping by the sun's rays. In these beds they may remain two years, when, in the spring, they should be transplanted to the nursery, where they may remain till they are planted out for good.

During the time they are in the nursery, and after planting out, many will have a tendency to droop in their leading shoot. As soon, therefore, as this is perceived, an upright stake must be driven into the ground, to which the shoots should be tied with bass matting to keep them in their upright growth. This, however, will not always effect it; for I have known some, after being tied, so effectually turn the shoot downwards over the bandage, though loose, as to appear as if they were beat down on purpose. The Larch-tree, which is nearly allied to this species, will sometimes rebel in this way; so that I think it would not be amiss, in both cases, whenever they first discover any signs of such a tendency, to lighten the head by nipping off the extremities of some few of the largest branches.

When these trees are planted out for good they should be left to nature, after being properly fenced. Not a knife nor a hatchet should come near them; lopping even their lowest branches is so injurious, that it both retards their growth and diminishes their beauty.

It is matter of surprize that this tree hath not been more cultivated in England formerly; for, till within a few years past, there were but few here; since it would

but the right Phœnician resembles more the Juniper, bearing a cone not so pointed as the other, as we shall come to shew. CHAP. III.

After these, I shall not here descend to the inferior kinds, which some call Dwarfs, and common Juniper-like Shrubs, fitter to head the borders of coronary gardeners, and to be shorn. There is yet another of the North-America lighter than cork itself, of a fragrant scent, which is its only virtue.

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be a great ornament to barren bleak mountains, where few other trees will grow so well, it being a native of the coldest parts of mount Libanus, where the snow continues great part of the year. And, from the observations made of those now growing in England, it is found they thrive best on the poorest soil; for such of them as have been planted in a strong, rich, loamy earth, have made but a poor progress, in comparison to such as have grown upon a stony meagre soil. And that these trees are of quick growth, is evident from four of them now growing in the physic garden at Chelsea, which, as I have been credibly informed, were planted there in the year 1683, and at that time were not above three feet high; two of which trees are at this time (viz. 1774) upwards of twelve feet and a half in girth, at two feet above ground, and their branches extend more than twenty feet on every side their trunks; which branches, though they are produced twelve or fourteen feet above the surface, do at every termination hang very near the ground, and thereby afford a goodly shade in the hottest season of the year.

There are said to be a few Cedar-trees remaining still upon mount Libanus, which are preserved with a religious strictness: For we are informed, from the Memoirs of the Missionaries in the Levant, that, upon the day of the transfiguration, the Patriarch of the Maronites, (Christians inhabiting mount Libanus) attended by a number of bishops, priests, and monks, and followed by five or six thousand of the religious from all parts, repairs to these Cedars, and there celebrates that festival which is called "The feast of Cedars." We are also told that the Patriarch officiates pontifically on this solemn occasion; that his followers are particularly mindful of the Blessed Virgin on this day, because the scripture compares her to the Cedars of Lebanon; and that the same holy father threatens with ecclesiastical censure those who presume to hurt or diminish the Cedars still remaining.

The epithet of *lofty* given to the Cedar is by no means applicable, since from the experience we have of these trees growing in England, as also from the testimony of travellers who have visited the few remaining ones on mount Libanus, they are not inclined to be lofty, but, on the contrary, extend their branches very wide. The Psalmist makes a proper and fine allusion to this tree in his description of the flourishing state of a people. "They shall spread their branches like the Cedar-tree."

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After all these exoticicks brought from our plantations, answering to the name of Cedar, I should esteem that of the Bermuda little inferior, if not superior to the noblest Libanon; and next, that of Carolina for its many uses and lasting.

* Le Bruyn.

Having spoken of their several species, we come now to the culture. These are best raised from the seeds, since it would be difficult to receive any store from abroad. To begin with that of mount Libanus: Those which seem of the greatest antiquity are indeed majestic, extending the boughs and branches, with their cones *sursum spectantia*, as by most we are told; tho' a late traveller * found them otherwise, *depending*, like other coniferous trees. The sturdy arms, though in smaller sprigs, grow in time so weighty as often to bend the very stem and main shaft, whilst that which is most remarkable, is the structure of the cones and seed receptacles, tacked and ranged between the branch-leaves in such order as nothing appears more curious and artificial, and at a little distance exceedingly beautiful. These cones have the bases rounder, shorter, or rather thicker, and with blunter points, the whole circum-zoned, as it were, with pretty broad thick scales, which adhere together in exact series to the very top and summit, where they are somewhat smaller; but the entire lorication smoother couched than those of the Fir-kind. Within these repositories, under the scales, nestle the small nutting seeds, or rather kernels, of a pear-shape; which, how nourished and furnished from the central style, with their other integuments, is admirably described by Mr. Ray, as that of the stalk of the clogs, thicker and longer, and so firmly knit to them, that it requires considerable force to part them from the branch without splitting the arm itself. We have said nothing concerning the leaf of this tree, which much resembles those of the Larix, but somewhat longer and closer set, erect and perpetually green, which those of the Larch are not—but hanging down, drop off and desert the tree in winter.

The seeds drop out of the cones as the Fir and Pine kernels do when the air, sun, or moisture open and unglue the scales, which naturally it else does not in those of the Cedar till the second year; but which, after all the preparations of burying in holes made in the earth and sand, in which they are apter to rot, may more safely be done by exposing the clogs discreetly to the sun, or before a soft and gentle fire, or, I think, best of all, by soaking them in warm water.

The lachrymæ, gum, and other transudations serve more for unguents and the Chirurgeon's box, than for other medicaments, in which we find Pliny has little faith. But that which is more remarkable, is the virtue of the famous timber of this noble tree, being proof against all putrefaction of human and other bodies, above all other ingredients and compositions of embalmers; and that by a pretty contradiction, giving life, as it were, to the dead, and destroying the worms which are living, as it does where any goods are kept in chests and presses of the wood, excepting woollen cloth and furs, which it is observed they corrupt. In the mean time, touching the manner of these operations, as it concerns the preservation of the dead, see more where we speak of Cypress; the effects being ascribed to the extream bitterness of the resinous juices, whilst the odour is most grateful. The worthy Mr. Ray mentions the powder and saw-dust of Cedar to be one of the greatest secrets used by our Pollinators and Mountebanks, who pretend to this embalming mystery: And indeed, that the dust and very chips are exitial to moths and worms, daily experience shews us; tho' none in mine, better than the dried leaves and stalks of Marum-Syriacum, familiarly planted in our gardens. What, therefore, the late traveller Dampier speaks of Cedar, which he has seen worm-eaten, could neither be that of Libanus or Bermudas, but haply of Barbadoes, Jamaica, or some other species. Note, that the Cedar is of so dry a nature, that it does not well endure to be fastened with nails, from which it usually shrinks, and therefore pins of the same wood are better. Whatever other property this noble tree is deservedly famous for, it is said to yield an oil, which, above all other, best preserves the monuments of the learned, books and writings; whence *Cedro Dignus* became one of the highest Elogies.

Touching the diuturnity of this material, it is recorded, that in the temple of Apollo at Utica, there was found timber of near two thousand years old; and, at Saguntum, in Spain, in a certain Oratory consecrated to Diana two centuries before the destruction of Troy, a beam, which has been brought to Zant: The great Sesostris, king of Egypt, built a vessel of Cedar of two hundred and eighty cubits, all over gilded without and within: And the statue of the goddess in the famous Ephesine Temple was said to be of this material also, as was most of the timber-work of that glorious structure. Though as to the idol τὸ Διοπετὲς mentioned in the Acts, (when the mob rose up against the Apostle) some will have it to be of Ebony, others of a Vine-tree, the most unlikely of all the rest.

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for the carver. The Sittim, mentioned in holy writ, is thought to have been a kind of Cedar, of which most precious utensils were formed.

As to the magnitude of Cedar-trees, we read of divers whose bodies eight or nine persons could not embrace, as we shall shew hereafter, not here to let pass what Josephus relates Solomon planted in Judea, who doubtless tried many experiments of this nature, none being more kingly than that of planting for posterity. I do not speak of those growing on the mountains of Libanon, in the northern and colder tracts of Syria, or what store those forests of them then afforded. But, as we are informed by that curious traveller Ranwolffius *, since confirmed also by the Virtuoso Monconys, there were not remaining above twenty-five of those stately trees; and since they were there, but sixteen of that small number, as the ingenious Mr. Mandeville reports in his journey from Aleppo to Jerusalem: There was yet, he says, abundance of young trees, and a single old one of a prodigious size, twelve yards and six inches in the girth. I suppose the same described by the late traveller Bruyn, who, speaking of the shadow of this umbrageous tree, alludes to that of Hosea xiv. 5, which, it is not improbable, might be one of those yet remaining in the place, where that heroic prince employed fourscore thousand hewers at work for the materials of one only temple, and the palace he built in the city; a pregnant instance what time, negligence, and war will bring to ruin. But to return to what is said of their present number, Le Bruyn, whom just now we mentioned, makes them thirty-five or thirty-six, for he could not exactly tell; and pretends, like our Stenhenge on Salisbury plain, none could ever yet agree in their number.

* In Itin.

In short, upon reflection of what we have hitherto concerning the universal waste and destruction of timber-trees, where due regard is not taken to propagate and supply them, whole countries have suffered as well as particular provinces. Thus the Appennines are stripped of their goodly Pine and Fir-trees (which formerly the Naturalist commends those mountains for) to that degree, as to render not only the city of Florence, but Rome herself, so exposed to the nipping Tramontans, (for so they call the northern winds) that almost nothing which is rare and curious will thrive without hyemation and art; so as, even through the most of those parts of Italy, on this side the kingdom of Naples, flanked by the Alpestral hills, clad, as they perpetually are, with snow, they are fain to house and retire their Orange, Citron, and other delicate and tender plants as we do

in England. There remains yet one mountain among the Appennines, covered and crowned with Cypress, whereof some are of a considerable stature. Nor is all this indeed so great a wonder, if we find the entire species of some trees totally lost in countries, as if there never had been any such planted or growing in them. Be this applied to Fir and Pine, and several other trees, for want of culture, several accidents in the soil, air, &c. which we daily find produces strange alterations in our woods, the Beech almost constantly succeeding the Oak, to our great disadvantage, whilst we neglect new seminations. Herodotus, speaking of the Palms plentifully growing about Delos, says the whole species was utterly lost. More I might add on this subject; but perhaps I have been too long on these remarks—and long enough on cold mount Libanus.

JUNIPER*.

1. Let it not seem unduly placed, if, after such giants, we bring this humble shrub (such as abound with us being so reckoned) to claim affinity to the tallest Cedar; since, were not ours continually cropped, but

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* The real and distinct species of the Juniper are,

1. JUNIPERUS (*Communis*) foliis ternis patentibus mucronatis bacca longioribus. Lin. Sp. Plant. 1470. *Juniper with spreading sharp-pointed leaves placed by threes.* Juniperus vulgaris fruticosa. C. B. P. 488. *The Common Juniper.*

Of the Common Juniper there are two sorts: 1. The English Juniper. 2. The Swedish Juniper.

The English Juniper, though naturally of our own growth, is very little known in many parts of England; for it grows naturally only in dry, chalky, sandy land; and where the soil is opposite to this, it is rarely found. Thus, in Leicestershire it is so little known, that, when growing amongst other trees in a shrubbery, it is as much enquired after as any of the most rare and curious sorts; and indeed, when properly raised from seeds, and planted in gardens, it is a pretty spreading evergreen shrub. Those who have been used to see it in its wild state, on sandy, barren commons, &c. will have little inducement to plant it, as there they will see it procumbent, seldom shewing a natural tendency to aspire; but when planted in a good soil, it will grow to the height of fifteen or sixteen feet, and will produce numerous branches from the bottom to the top, forming a well-looking, bushy plant. These branches are exceeding tough, and covered with a smooth bark of a reddish colour, with a gentle tinge of purple. The leaves are narrow and sharp-pointed; they grow by threes on the branches; their upper surface has a greyish streak down the middle, but their under is of a fine green

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maintained in single stems, we might perhaps see some of them rise to competent trees, fit for many curious works, such as tables, cabinets, coffers, inlaying, floors, carvings, &c. We have of some of these trees so large as to have made beams and rafters for a certain temple in Spain, dedicated to Diana; nor need we question their being fit for other buildings; celebrated for its emulating the Cedar, though not in stature, yet in its lastingness; and such, I think, the learned Dr. Sloane mentions growing in Jamaica, little inferior to the Bermudas.

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colour, and they garnish the shrub in great plenty. This tree flowers in April and May. The flowers are small, of a yellowish colour, and make no figure. They are succeeded by the berries, which are of a blueish purple when ripe.

The Swedish Juniper has a natural tendency to grow to a greater height, and consequently has more the appearance of a tree than the former. Sixteen or eighteen feet, however, is the highest it commonly grows to; and the plants raised from its seeds have, for the most part, a tendency to grow higher, and become more woody and branching. The leaves, flowers, and fruit grow in the same manner as the former, which shews it to be a variety only. Old Botanists mention it as a distinct species: Caspar Bauhine asserts this, and calls one the Shrubby Juniper, and the other the Tree Juniper; he also mentions another sort, which he calls the Lesser Mountain Juniper, with a broader leaf and a larger fruit.

2. JUNIPERUS (*Oxycedrus*) foliis undique imbricatis obtusis, ramis teretibus. *Juniper with obtuse leaves every where lying over each other, and taper branches.* Juniperus major, baccâ rufescente. C. B. P. 489. *Greater Juniper with a brownish berry. Spanish Juniper.*

This sort grows rather higher than the Swedish in some soils. It will be feathered from the bottom to the top, if left untouched from the first planting, or if not crowded with other trees. The leaves are awl-shaped, and finely spread open. They are very short, sharp-pointed, and give the tree a fine look. The flowers of this shrub are succeeded by large reddish berries, which are very beautiful when ripe.

3. JUNIPERUS (*Thuifera*) foliis quadrifariam imbricatis acutis. Lin. Sp. 1471. *Juniper with awl-shaped acute leaves placed by fours, lying over each other.* Juniperus major baccâ ceruleâ. C. B. P. *Greater Juniper with blue berries.* Cedrus Hispanica procerior fructu maximo nigro. Tourn. Inst. *Spanish Cedar.*

The Spanish Cedar grows plentifully in the country from whence it derives its name, and is itself a regular growing tree, rising in a conical form, if the branches are untouched, to the height of thirty feet or more. The leaves are imbricated, and lie over each other four ways; they are acute, and of a fine green co-

2. Of Juniper we have three or four sorts, Male, Female, Dwarf; whereof one is much taller and more fit for improvement. The wood is yellow, and being cut in March, sweet as Cedar, whereof it is accounted a spurious kind; all of them difficult to remove with success; nor proper they being shaded at all or over-dripped. The Swedish Juniper, now so frequent in our modish gardens, and shorn into pyramids, is but a taller and somewhat brighter sort of the Vulgar.

3. I have raised them abundantly of their seeds, neither watering nor dunging the soil, which in two months will peep; and being governed like the Cypress, are apt for all the employments of that beautiful tree. To make it grow tall, prune and cleanse it to the very stem; the male best. The discreet loosening of the earth about the roots also, makes it strangely

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four: From these properties only an idea of a fine tree may be had. The flowers are insignificant to a common observer, but they are succeeded by berries which make a good show when ripe; for they are very large, and of a fine black colour, and adorn the young branches in great plenty.

4. JUNIPERUS (*Lycia*) foliis ternis undique imbricatis ovatis obtusis. Flor. Leyd. 90. *Juniper with oval blunt leaves, which every where lie over each other. Cedrus, folio Cupressi, media majoribus baccis. C. B. P. 488. Middle Cedar, with a Cypress leaf and larger berries.*

The Lycian Cedar grows naturally in the country so called, and is as common in Spain as the former sort. It will rise to the height of about twenty-five feet. The branches have naturally an upright position, and their bark is of a reddish hue. The leaves are every where imbricated, obtuse, and of an oval figure. They resemble those of the Cypress, and are very beautiful. The flowers are succeeded by large oval berries, of a brown colour, and are produced in plenty from the sides of the younger branches all over the tree.

5. JUNIPERUS (*Phœnicia*) foliis ternis oblitteratis imbricatis obtusis. Lin. Sp. 1471. *Juniper with leaves placed by threes, which are obliterate, obtuse, and lying over each other. Cedrus folio Cupressi major, fructu flavescente. C. B. P. Greater Cedar with a Cypress leaf and yellowish fruit.*

The Phœnician Cedar seldom grows higher than twenty feet, and is a beautiful upright sort, forming a kind of pyramid, if untouched, from the bottom. It has both ternate and imbricated leaves; the under ones grow by threes, and spread open; and the upper ones are obtuse, and lie over each other like the Cypress. The flowers are produced from the ends of the branches; and the fruit that succeeds them is rather small, and of a yellow colour. It is commonly called the

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to prevent your expectations, by suddenly spreading into a bush fit for a thousand pretty employments; for, coming to be much unlike that which grows wild, and subject to the treading and cropping of cattle, &c. it may be formed into most beautiful and useful hedges. My late brother having formerly cut out of one only tree an arbour capable of receiving three persons to sit in; it was at my last measuring seven feet square and eleven in height, and would certainly have been of a much greater altitude, and farther spreading, had it not continually been kept shorn: But what is most considerable, is the little time since it was planted, being then hardly ten years, and then it was brought out of the common, a slender bush of

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Phœnician Cedar, though it is found growing naturally in most of the southern parts of Europe.

6. JUNIPERUS (*Virginiana*) foliis ternis omnibus patentibus. *Juniper with leaves placed by threes, which are all of them spreading.* Juniperus Virginiana folio ubique Juniperino. Boerh. Ind. *Cedar of Virginia, or Red Cedar.*

The Red Virginia Cedar is a tree of great use and beauty. Its growth is upright. The branches form a beautiful cone; and if left unsprigged, the tree will be feathered to the very base. It grows to near forty feet high; and the timber is valuable for many excellent uses. It will continue sound and uncorrupt for many ages, being possessed of a bitter resin, which prevents the worms from attacking it. The wood may be converted into utensils of most sorts, as well as applied to a great part of the uses to which the Cypress is adapted. It is remarkable, however, for being of a very brittle nature, and is therefore not proper to be introduced into buildings where any great weight is to be lodged. Nevertheless, in Virginia and Carolina, where they abound, these trees are used in structures of all kinds, with this precaution; and the inhabitants prefer the timber for wainscoting their rooms and building of vessels. Those who are desirous of having variety of timber-trees in their plantations, will doubtless be inclined to allow this a place.

7. JUNIPERUS (*Bermudiana*) foliis inferioribus ternis, superioribus quadrifariam imbricatis. Mill. Dict. *Juniper with spreading under-leaves placed by threes, and the upper by fours, which lie close over each other.* Juniperus Bermudiana. H. L. *Cedar of Bermudas.*

The Cedar of Bermudas is a very tender plant, and requires not only a dry warm soil, and a well-sheltered situation, but open, mild winters, to make it continue through them; so that when a person is desirous of having an extensive collection, then, and then only, are these sorts to be sought after. When they are planted abroad in the warmest places, sheds should be made for them of boards well clofed, and should be at hand for the gardener to cover the plants with at the first

about two feet high. But I have experimented a proportionable improvement in my own garden, where I do mingle them with Cypress; and they would perfectly become their stations where they might enjoy the sun, and may very properly be set where Cypress does not so well thrive, namely, in such gardens and courts as are open to the eddy-winds, which indeed a little discolours our Junipers when they blow easterly towards the spring, but they constantly recover again; and besides, the shrub is tonfile, and may be shorn into any form. I wonder Virgil should condemn its shadow—*Juniperi gravis umbra*—I suspect him misreported.

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approach of frosty weather, and to uncover them at its departure. These sheds are to be enlarged as the trees advance in height; for though they will more peculiarly want protection when young, yet a severe frost, with cutting black winds, will endanger the destroying very full-grown trees. These sheds may be made like the sentinel-boxes, and must always be of a proportionable size to the tree. This species grows to be a large timber-tree in America; and we used to receive the wood from thence in greater plenty than we do at present. It is possessed of a very strong odour, and rooms wainscotted with it are much scented, which to many is agreeable, but not to all; though most persons agree it renders the air wholesome. We never must expect to raise this tree to answer any purposes in the timber-way; the most we may expect is a few only in our plantations, for variety and observation. It is observable, as these trees advance in growth, their branches become cornered, and their leaves suffer a change in their nature. At first they are narrow, sharp-pointed, and produced by threes round the branches, spreading open in a pretty manner. The leaves afterwards grow shorter, and are produced by fours, without having any tendency to spread open. The flowers are produced nearly in the same manner as the Virginian kinds, and are succeeded by purplish berries.

8. JUNIPERUS (*Barbadensis*) foliis omnibus quadrifariam imbricatis; junioribus ovatis, senioribus acutis. Prod. Leyd. 90. *Juniper with all the leaves placed by fours, lying over each other, the young being oval, the older acute.* Juniperus maxima cupressi folio minimo, cortice exteriori in tenues phylaras spirales ductili. Sloan. Cat. Jam. 128. *Greatest Juniper with the least Cypress leaf, and the outer bark splitting off in thin ductile pieces.* Commonly called *Jamaica Berry-bearing Cedar*.

This Cedar is a very large timber-tree in Jamaica and other islands where it grows naturally, and is much sought after for the building of ships, &c. The branches are spreading, many are cornered, and their bark is rough, and of a brown colour. The leaves grow by fours, and lie over each other. They are small; the older leaves are sharp-pointed, but the younger are more oval; and many are imbricated in a manner like the Cypress. Neither the male nor female flowers, which

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3. The berries afford, besides a tolerable pepper, one of the most universal remedies in the world to our crazy Forester. Being swallowed only, they instantly appease the wind-cholic; and, in decoction, they are most sovereign against an inveterate cough. They are of rare effect being steeped in beer; and in some northern countries they use a decoction of the berries as we do coffee and tea. The water is a most singular specific against the gravel in the reins; but all is comprehended in the virtue of the theriacle, or electuary, which I have often made for my poor neighbours, and may well be termed the forester's panacea against the stone, rheum, pthysic, dropsy, jaundice, inward imposthumes, nay, palsy, gout, and the plague.

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are found on different plants, make any figure; and they are succeeded by a small brownish berry. This is a very tender plant, though if it has a shed like the other, it may be nursed until it becomes a large tree. In very hard frosts, care must be taken to lay plenty of litter, &c. round the bottom of the shed (which must indeed be observed for both the sorts) to keep the frost from penetrating into the ground. The shed must be always taken off, and the litter kept from the stem, on the first return of fine open weather.

9. JUNIPERUS (*Sabina*) foliis oppositis erectis decurrentibus, ramis patulis. *Juniper* with opposite, erect, running leaves, and spreading branches. *Sabina* folio Cupressi. B. P. 487. *Savin* with a Cypress-leaf; or *Common Savin*.

Of this species there are three sorts: 1. Spreading Savin; 2. Upright Savin; 3. Striped Savin.

The Spreading Savin is a low-spreading shrub; the branches have a natural tendency to grow horizontally, or nearly so; so that it must be ranked amongst the lowest growing shrubs; inasmuch that unless it is planted against a wall, or supported in an upright position, we seldom have it higher than two feet. When it is to be planted and left to Nature, room must be allowed for its spreading; for it will occupy a circle of more than two or three yards diameter, and will choke any other less-powerful shrub that is placed too near it. The bark on the older shoots is of a light-brown colour; but on the younger, which are covered with leaves running into each other, it is of as fine a green as any shrub whatever. These leaves are erect, and acute-pointed. They are placed opposite, and grow a little like those of the French Tamarisk. This shrub seldom produces flowers or berries; but when any berries do appear, they are small and of a blueish colour. It deserves a place amongst low-growing Evergreens, on account of the fine strong green of its leaves both in winter and summer; but it is valuable for nothing else; for it produces neither ornamental flowers nor fruit, and is possessed of a very strong smell; inasmuch that when the branches and leaves are accidentally shook by a person's passing by, the whole atmosphere is immediately filled with a fetid scent highly offensive and disagreeable. The juice of Savin, mixed

itself, taken like Venice Treacle. Of the extracted oil, with that of nuts, is made an excellent good varnish for pictures, wood-work, and to preserve polished iron from the rust. The gum is good to rub on parchment or paper to make it bear ink: And the coals, which are made of the wood, endure the longest of any; so as live embers, after being a year covered, have been found in the ashes. See St. Hierom ad Fabiolam, upon that expression, Psal. cxx. 4. If it arrive to full growth, spits and spoons, imparting a grateful relish, and very wholesome where they are used, are made of this wood, being well dried and seasoned: And the very

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with milk and honey, is said to be good to expel worms from children; as well as, without that mixture, to destroy those in horses, for which purpose it is strongly recommended.

The Upright Savin is a delightful tree; it will grow to be twelve or fourteen feet high. The branches are numerous and slender, and give the tree a genteel air. The leaves are nearly of the same nature with the other, though they are of a darker green. The flowers are produced in plenty, but make no show; and they are succeeded by berries in such plenty as to cause a good effect. The upright tendency of this tree, with the very dark green colour of the leaves, which causes a good contrast with others that are lighter, together with its not being possessed of that strong disagreeable scent of the other sort, makes it a valuable shrub for Evergreen plantations.

The Striped Savin has not that tendency to spread like the Common, neither does it grow quite so upright as the Berry-bearing Savin. It is a fine plant, and at present is rather scarce. The ends of several of the young shoots are of a fine cream-colour; nay, all the smaller branches appear often of that colour, and at a distance have the appearance of flowers growing on the tree. To those who are fond of variegated plants, this shrub has both beauty and scarcity to recommend it.

The Juniper is of the class and order *Diœcia Monadelphia*.

Having given a general account of the various species of this genus of plants, I shall now consider their propagation. They are raised from seeds which must be sown as soon as ripe, for when they are kept until spring, they will not come up until the second year. The ground in which the seeds of the *hardy* sorts are sown, should be fresh and light, but not dunged: being well dug and formed into beds, sow your seeds pretty thick, and sift some earth over them about half an inch thick; the beds will require no farther care than only to keep them clear from weeds; and toward the middle or latter end of April, you will find some of the plants appear above ground, though, perhaps, the greatest part of them may lie till the spring following before they come up; therefore you should carefully clear the beds from weeds, and in very dry weather refresh them with some water, which will greatly promote the growth of

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chips render a wholesome perfume within doors, as well as the dusty blossoms in spring without, and excellent within to correct the air, and expel infection; for which purpose the wood should be cut about May, and the rafures well dried.

4. And since we now mention pepper, it is by the most prudent and princely care of his late Majesty Charles II. that I am assured of a late solemn act of council, enjoining the preserving of that incomparable spice, which comes to us from Jamaica under that denomination, tho' in truth it

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those plants which are up, and also cause the other seeds to vegetate; but if the beds in which these seeds are sown are much exposed to the sun, they should be shaded with mats in the day; for when the plants come first up, they will not bear too much heat. In these beds they should remain till the second autumn, when you must prepare some beds to transplant them into, which should also be of light, fresh, undunged soil; and having well dug and cleansed the ground from all noxious weeds and roots, you should make it level; and then in the beginning of October, which is the proper season for removing these plants, raise up the young plants with a trowel, preserving as much earth as possible to their roots, and plant them into beds about five or six inches asunder each way, giving them some water to settle the earth to their roots; and if it should prove very dry weather, you may lay a little mulch upon the surface of the ground round their roots, which will be of great service to the plants: But as many of the seeds will be yet left in the ground where they were sown, so the beds should not be disturbed too much in taking up the plants; for I have known a bed sown with these berries, which has supplied plants for three years, drawing some of the berries having lain so long in the ground before they sprouted; therefore the surface of the beds should be kept level, and constantly clean from weeds.

The plants may remain two years in the new beds, observing to keep them clear from weeds; in the spring you should stir the ground gently between them, that their roots may with greater ease strike into it; after which time they should be transplanted, either into a nursery, at the distance of three feet row from row, and eighteen inches asunder in the rows, or into the places where they are to remain for good. The best season to transplant them (as I before observed) is the beginning of October, when you should take them up carefully, preserving a ball of earth to their roots; and when planted, their roots should be mulched; all which, if carefully attended to, as also observing to refresh them with water in very dry weather until they have taken new root, will preserve them from the danger of not growing; and they being extreme hardy in respect to cold, will defy the severest of our winters, provided they are not planted in a moist or rich soil.

In order to have these trees aspire in height, their under branches should be taken off, especially where they are inclined to grow strong, but they must not be kept too closely pruned, which would retard their growth; for all these Evergreen trees do more

be a mixture of so many aromatics in one, that it might as well have been called All-spice, holding a near alliance to Cinnamon, Nutmeg, and Mace. And that there is not only prohibited the destruction of these trees, for it seems some prodigals used to cut them down for the more easy gathering, but order taken likewise for their propagation, and that assays and samples be from time to time sent over, what other fruits, trees, gums, and vegetables may there be found; and which I prognostic will at last also incite planters there to think of procuring Cinnamon, Cloves, and Nutmeg-trees indeed, from the East-Indies, and what other useful curio-

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or less abound with a resinous juice, which in hot weather is very apt to flow out from such places as are wounded; so that it will not be advisable to take off too many branches at once, which would make so many wounds, from which their sap in hot weather would flow in such plenty, as to render the trees weak and unhealthy.

The two Virginian Cedars grow to a prodigious height, and in their native country afford excellent timber for many uses; but with us there are very few which are above thirty-five or forty feet high, though there can be no doubt of their growing larger; for they thrive very fast after the three first years, and resist the sharpest frost of our climate exceeding well, and are very apt to grow straight and regular, provided they are not suffered to shoot out too much at bottom.

These are also propagated by seeds, which must be procured from Virginia or Carolina, (for they rarely produce ripe seeds in England) and sown as directed for the other Junipers; but as this seed cannot be procured in England till spring, so when sown at that season, it remains in the ground until the succeeding spring before the plants appear; therefore you must observe to keep the beds clear from weeds, and not suffer the seeds to be disturbed, which is often the fault of some impatient people, who think, because the plants do not rise the first year, that they will never come up, and so dig up the ground again, whereby the seeds are buried; but if they are suffered to remain, they seldom fail to grow, though sometimes it is two years after sowing before they come up. When the plants come up they must be carefully weeded, and in dry weather should be refreshed with water, which will greatly forward their growth; and the autumn following there should be a little rotten tan strewed upon them, to keep out the frost. In this bed the plants may remain till they have had two years growth, then they should be transplanted into other beds, as directed for the other sorts, observing to preserve a ball of earth to their roots; and after they are planted, if the season proves dry, they must be carefully watered, and the surface of the ground covered with mulch, to prevent the sun and wind from entering the earth to dry their fibres; but they should not be too much watered, which often proves injurious to these trees, by rotting their tender fibres soon after they are produced.

In these beds they may remain two years, observing to keep them clear from weeds; and in winter you should lay a little fresh mulch upon the surface of the ground round their roots, which will prevent the frost from penetrating to them, and effectually

Book II. fities do not approach our northern bear, and to plant them in Jamaica, and other of the western islands, as a more safe and frugal expedient to humble our emulous neighbours, since there is nothing in their situation, or defect of nature's benignity, which ought in the least to discourage us. And what if some of the trees of those countries, especially such as aspire to be timber, and may be of improvement amongst us, were more frequently brought to us likewise here in England: Since we daily find how many rare exotics and strangers, with little care, become endenized, and contented to live amongst us, as may be seen in the Platanus, Constantinople Chestnut, the greater Glandiferous Ilex, Cork, Nux Vescicaria, (which is an hard wood fit for the turner) the Styra, Bead-tree, the famous Lotus, Virginian Acacia, Guaiacum Pa-

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preserve them; for while the plants are so young, they are liable to be injured by hard frosts, when too much exposed thereto; but when they have attained a greater strength, they will resist the severest colds.

After two years, they should either be removed into the nursery, (as was directed for the common Juniper) or transplanted where they are designed to remain, observing always to take them up carefully, otherways they are subject to fail upon transplanting; as also to mulch the ground, and water them as before directed, until they have taken root; after which they will require no farther care, than only to keep the ground clear about their roots, and to prune up their side-branches to make them aspire in height.

The soil in which you plant these trees should be fresh and light, but must not be dunged, especially at the time when they are planted; for dung is very hurtful to them, if it be not quite rotted to mould; therefore the mulch which is laid upon the surface of the ground should not be dung, but rather some old tanners' bark or sea-coal ashes, which will prevent the frost from penetrating deep into the ground.

These trees being thus managed, will, in a few years, rise to a considerable stature, and by the variety of their evergreen leaves and manner of growth, will greatly add to the beauty of all plantations, if rightly disposed, which indeed is what we seldom observe in any of the English gardens or wildernesses; for there are few people who consider the different growths of the several trees with which they compose such plantations, so as to place the tallest growing trees the backwardest from sight, and the next degree to succeed them, and so gradually diminishing till we come to the common Juniper, and others of the same growth. In this manner all the trees will be seen, and the gradual declivity of their tops will appear like a verdant slope, and be much more agreeable to the sight, as also more advantageous to the growth of the trees, than to place shrubs of humble growth near such plants as will grow to the first magnitude, whereby the shrub is not only hid from sight, but will be over-shadowed and destroyed; nor can the distance which each tree requires, be so justly proportioned any other way; for in this distribution, the largest trees being separated by themselves, may be placed at a due distance; and those of a middling growth succeeding, may be

tavinum, Paliurus, Cypress, Pines, Fir, and sundry others, which grow already in our gardens, exposed to the weather; and so doubtless would many more. So judiciously observed is that of the learned author of the History of the Royal Society, part iii. sect. xxviii. "That whatever attempts of this nature have succeeded, they have redounded to the great advantage of the Undertakers. The Orange of China being of late brought into Portugal, has drawn a great revenue every year from London alone. The Vine of the Rhine, taking root in the Canaries, has produced a far more delicious juice, and has made the rocks, and sun-burnt ashes of those islands, one of the richest spots of ground in the world. And I will also instance in that which is now in a good forwardness; Virginia has already given silk for the cloathing of our King; and it may happen hereafter to give cloaths to a great part of Europe.

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accordingly allowed sufficient room; and the smaller, which are next the light, being placed much closer, will hide the naked stems of the larger trees, and produce a most agreeable effect."

The Bermudas Cedar being a native of that island, and also of the Bahama islands, is much tenderer than either of the former sorts, except that of Jamaica, so is not likely to thrive well in this country; for although many of these plants have lived several years in the open air in England, yet whenever a severe winter happens, it either kills them, or so much defaces them, that they do not recover their verdure for some years.

These plants are propagated by seeds in the same manner as the former, with only this difference, that these should be sown in pots or tubs of earth, that they may be removed into shelter in the winter time, otherwise the young plants are often hurt by hard frosts; but they will require no more care than only to be placed under a common hot-bed frame, where the glasses may be constantly kept off in mild weather, when they cannot have too much free air, and only covered in hard frosts. These seeds constantly remain in the ground until the second year before they come up, therefore the earth in the pots should not be disturbed; and in the summer time they should be placed in the shade, to prevent the earth from drying too fast; and in very dry weather they should be often watered, but do not give too much water to them at once, which would rot the seeds.

The spring following, when the young plants come up, they must be carefully cleared from weeds, and in dry weather refreshed with water; but should stand, during the summer season, in a place defended from strong winds; and in winter must be placed under frames, where they may be covered in hard frosty weather, but must have open air when the weather is mild. In April following you should transplant them each into a small pot filled with fresh light earth, being careful to raise them up with a ball of earth to their roots; and when they are planted, you should water them, to

Book II. "and be a vast treasure to our Kings. If the silk-worms shall thrive there, of which there seems to be no doubt, the profit will be inexpressible. We may guess at it, by considering what numbers of Caravans, and how many great cities in Persia are maintained by that manufacture alone, and what mighty customs it yearly brings unto the Sophi's revenue." Thus he. To which we might add, that not only the China Orange mentioned by the Doctor, but the whole race of Orange trees, were strangers in Italy, and unknown to Rome; nor grew they nearer than Persia, whence first they travelled into Greece, as Athenæus tells us. But to return to that of China, and give some account of its propagation in Europe: The first was sent for a present to the old Conde Mellor, then Prime Minister to the King of Portugal; but of that whole case they came to Lisbon in, there was but one only plant which escaped the being

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settle the earth to the roots; then place the pots in a warm situation, where they may be defended from sun and wind: but if you will plunge the pots into a moderate hot-bed, it will greatly promote their taking new root; however, you must carefully defend them from the great heat of the sun, which is injurious to them when fresh removed; but when they have taken root, you may expose them by degrees to the open air. If you suffer the pots to remain plunged all the summer, it will preserve the earth therein from drying so fast as it would do, if they were set upon the ground.

In October you should again remove these plants into shelter, or else plunge the pots into the ground under a warm hedge, where they may be protected from the cold north and east winds; and in the spring following you must shift the plants into pots of a size larger, taking away some of the earth from the outside of the ball, and adding some fresh, which will promote their growth; and so continue to manage them as was before directed, until you plant them out into the places where they are designed to remain; which should not be done till they are four or five years old, by which time they will be strong enough to bear the cold of our common winters.

The reason for my directing these plants to be preserved in pots until they are planted out for good is, because they are difficult to transplant, and being tender will require some shelter while young; and whoever observes the method here laid down, will find the plants so managed to gain two years growth in six, from those raised in the open air, and be in less danger of being destroyed; and as the trouble and expence in raising them this way is not great, so it is worth practising, since in a few years the trees will recompense the trouble.

The timber of this tree is of a reddish colour, and very sweet, and is commonly known in England by the name of Cedar Wood; tho' there are divers sorts of wood called by that name, which come from very different trees, especially in the West-Indies, where there are several trees of very different appearances and genera, which have that appellation. It is this wood which is used for pencils, as also to wainscot

spoiled and tainted, that with great care it hardly recovered, to be since become the parent and progenitor of all those flourishing trees of that name, cultivated by our gardeners, though not without sensibly degenerating. Receiving this account from the illustrious son of the Conde, (successor in title and favour) upon his being recalled, (then an exile at our court, where I had the honour to be known to him) I thought fit to mention it in this place, for an instance of what the industry we have recommended would, questionless, in less than half an age, produce of wonders, by introduction, if not of quite different, yet of better kinds; and such variety for pulchritude and sweetness, that when, by some princely example, our late pride, effeminacy, and luxury (which has, to our vast charges, excluded all the ornaments of timber, &c. to give place to hangings, embroideries, and foreign leather) shall be put out of counte-

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rooms, and make stair-cases, it enduring longer sound than most other sorts of timber, which, perhaps, may be owing to some extreme bitter taste in the resin, with which the tree abounds; for it is very remarkable, that the worms do not eat the bottoms of the vessels built with this wood, as they do those built with Oak; so that the vessels built with Cedar are much preferable to those built with any other sort of timber, for the use of the West-India trade; but they are not fit for ships of war, the wood being so brittle as to split to pieces with a cannon ball.

The Jamaica Juniper is more impatient of cold than the Bermudas; it will not live through the winter in the open air in England, so the plants must be preserved in pots, and housed in the winter. This is propagated by seeds, in the same way as the Bermudas Cedar; but if the pots are plunged into a moderate hot-bed the second spring after the seeds are sown, it will bring up the plants sooner, and they will have more time to get strength before winter.

All the other sorts are hardy enough to live in the open air, so are very well worth propagating, as they will add to the variety of Evergreen plantations; some of the sorts will rise to a very considerable height, so may prove to be useful timber, and may be adapted to such soils as will not suit many other trees.

The Common Savin may be increased by slips, which, if planted almost at any time, or any how, will grow. The Upright Savin also is to be increased by slips planted in moist weather, in August, and kept shaded and watered in dry weather afterwards. This is the best way of treating cuttings of the Upright Savin, tho' they will often grow if planted at any time, either in winter or summer. The Striped Savin also is to be increased this way; though care must be always used to take off those branches that are most beautifully variegated, and such as are entirely of a cream-colour; for this will be the most probable method of continuing it in its variegated beauties. The Savin is also to be raised by berries; and by these the most upright and best plants are produced.

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nance, we may hope to see a new face of things for the encouragement of planters, the more immediate work of God's hands, and the natural, wholesome, and antient use of timber, for the more lasting occasions, and furniture of our dwellings. And though I do not speak all this for the sake of joined-stools, benches, cup-boards, massy tables, and gigantic bedsteads, the hospitable utensils of our forefathers; yet I would be glad to encourage the carpenter and the joiner, and rejoice to see that their work and skill do daily improve; and that by the example and application of his Majesty's Universities and Royal Society, the restoration and improvement of shipping and mathematical and mechanical arts, the use of timber grows daily in more reputation. And it were well if great persons might only be indulged to enrich and adorn their palaces with tapestry, damask, velvet, and Persian furniture, whilst by some wholesome sumptuary laws, the universal excess of those costly and luxurious moveables were prohibited meaner men, for divers politic considerations and reasons, which it were easy to produce; but by a less influence than severer laws, it will be very difficult, if not altogether impossible, to recover ourselves from a softness and vanity, which will in time not only effeminate, but undo the nation.

CYPRESS*.

1. This is either the Sative or Garden-tree, the most pyramidal and beautiful; or that which is called the male, though somewhat preposterously, which bears the small cones, but is of a more extravagant shape. Should we reason only from our common experience, even the Cypress-

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* Of this genus there are four species.

1. CUPRESSUS (*Sempervirens*) foliis imbricatis, frondibus quadrangulis. Lin. Sp. Pl. 1422. Cupressus meta in fastigium convoluta. f. Femina. Tourn. Inst. 587. Cupressus, C. B. P. 488. *Female*, or *Common Upright Cypress*.

This tree is very common in most of our old gardens, but at present is rather neglected. It adds a considerable beauty to wildernesses and clumps of Evergreens, and is reported to be valuable on account of its wood. There is a variety of this tree intitled, by Tournefort, *Cupressus ramos extra se spargens f. mas. Inst. 587*. This is commonly called the *Male Spreading Cypress*, and is the most common timber in some parts of the Levant. It is considerably larger than the Upright sort. If planted upon a warm gravelly soil it will prosper wonderfully; though not so finely shaped as the female, it makes up for that defect by its vigorous growth and strength, resisting all weathers. It is very proper to intermix with Evergreens of a second size next to Pines, to form clumps; in which class it will

tree was, but within a few years past, reputed so tender and nice a plant, that it was cultivated with the greatest care, and to be found only amongst the curious; whereas we see it now in every garden, rising to as goodly a bulk and stature as most which you shall find even in Italy itself: For such I remember to have once seen in his late Majesty's gardens at Theobalds, before that princely seat was demolished. I say, if we did argue from this topic, methinks it should rather encourage our countrymen to add yet to their plantations other foreign and useful trees, and not in the least deter them, because many of them are not as yet become endenized amongst us: But of this I have said enough, and yet cannot but still repeat it.

2. We read that the Peach was at first accounted so tender and delicate a tree, as that it was believed to thrive only in Persia; and even in the

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keep pace with the trees of the same line, and be very handsome: Besides, the wood of this tree is very valuable, when grown to a size fit for planks.—In the islands of the Archipelago, as Mr. Evelyn informs us, it was customary, upon the birth of a daughter, to plant a *Cupressetum*, or grove of Cypress-trees, to be given her for a portion. Hence every plantation of this kind was called *Das Filia*, or a Daughter's Dower. Were Gentlemen in this country to imitate this practice with other trees, they might provide handsome fortunes for their younger children without incumbering their estates.

2. *CUPRESSUS (Disticha)* foliis distichis patentibus. Hort. Cliff. 459. *Cupressus Americana*. Cat. Car. 1. *Cupressus Virginiana*, foliis acaciæ deciduis Hort. Amst. i. p. 113. *The Deciduous Cypress*.

This kind of Cypress, if stationed in a place suitable to its nature, will grow to the height of sixty feet. It is very hardy in respect to cold; and a share of the moistest part of the plantation must be allotted it. In Virginia and several parts of America, where this tree is a native, it is a real aquatic, being found growing to a very large size in places wholly covered with water; and with us, if planted in watery places, by the edges of rivers, ponds, springs, &c. it will be more luxuriant, and will proportionally arise to a greater height and bulk than if planted in a dry soil. This tree in the summer has a little the resemblance of an Evergreen, and the leaves have a pleasing effect, appearing in some respects like some sorts of the Acacias; and these are the chief inducements for its admission into the pleasure-ground.

3. *CUPRESSUS (Thyoides)* foliis imbricatis, frondibus ancipitibus. Lin. Sp. Pl. 1422. *Cypress with imbricated leaves, and branches standing two ways*. *Cupressus nana* Mari-

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days of Galen it grew no nearer than Egypt, of all the Roman Provinces, but was not seen in the city till about thirty years before Pliny's time; whereas there is now hardly a more common and universal tree in Europe. Thus likewise the Avellana travelled from Pontus, in Asia, into Greece, and from thence into Italy, to the city of Abellino in Campania. I might affirm the fame of our Damasco Plum, Quince, Medlar, Fig, and most ordinary Pears, as well as of several other peregrine fruit-bearing trees, and others; for even the very Damask Rose itself (as my Lord Bacon tells us, Cent. ii. Exp. 659.) is little more than an hundred years old in England: Methinks this should be of wonderful incitement. It was six hundred and eighty years after the foundation of Rome, before Italy had tasted a Cherry of their own, which being then brought thither out of Pontus (as the

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ana, fructu cæruleo parvo. Pluk. Mant. 61. *Dwarf Maryland Cypress with a small blue fruit.*

The branches of this tree are garnished with flat evergreen leaves, resembling those of the Arbor Vitæ; and the cones are no larger than the berries of the Juniper, from which they are not easily distinguished at a little distance; but upon closely viewing they are perfect cones, having many cells like those of the common Cypress. If these trees are planted in a moist strong soil, they make very great progress, and may, in such situations, become profitable for timber; but however this tree may succeed for timber, yet it will be a great ornament to large plantations of evergreen trees, especially in such places where there is naturally a proper soil for them; because, in such situations, there are not many sorts of Evergreen trees which thrive well, especially in cold places; and by increasing the number of these Evergreens, we add to the beauty of our gardens and plantations.

4. CUPRESSUS (*Juniperoides*) foliis oppositis decussatis subulatis patulis. Lin. Sp. Plant. 1422. Cupressus foliis linearibus simplicibus cruciatem positis. Mill. Dict. *Cypress with narrow single leaves placed crossways. The Cape Cypress.*

The branches of this species are numerous, slender, and spread themselves all round. The leaves are narrow, awl-shaped, about an inch long, of a light-green colour, and grow opposite to each other on the branches. The flowers come out from the sides of the branches like common Cypress, and they are succeeded by black fruit; but the seeds never ripen in England.

The Cypress, in the Linnæan system, belongs to the class and order *Monœcia Monodelphia*.

The manner of propagating the common Cypress is as follows: A warm border, or well-sheltered bed, should be prepared for the purpose, after having been well worked, turned over, and mellowed by the frosts all winter. The soil of this border, or bed,

above-mentioned Filberts were) did, after one hundred and twenty years, CHAP. III.
travel *ad ultimos Britannos*.

3. We had our first Myrtles out of Greece, and Cypress from Crete, which was yet a mere stranger in Italy, as Pliny reports, and most difficult to be raised; which made Cato to write more concerning the culture of it than of any other tree: Notwithstanding we have in this country of ours no less than three sorts, which are all of them easily propagated, and prosper very well if they are rightly ordered; and therefore I shall not omit to disclose one secret, as well to confute a popular error, as for the instruction of our gardeners.

4. The tradition is, that the Cypress, being a symbol of mortality, (they should say of the contrary) is never to be cut for fear of killing it. This makes them to impale and wind them about like so many Ægyptian mummies; by which means the inward parts of the tree being heated, for

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should be sandy; and if it is not naturally so, some drift-sand may be brought to mix with it, and worked all over the bed, at least six inches deep. Having the border prepared, the mould being smooth and fine, let a small part, sufficient to cover the seeds, be taken out, and then let the bed be raked smooth and fine. After this, sow the seeds all over it moderately thin; for if they are sown too thick the roots get matted together, so that the plants cannot be removed out of the seed-bed into the nursery, without great danger. The seeds being now sown regularly over the bed, riddle the mould that was taken out, over them, not quite half an inch thick. The beginning of March is the best time for this work; and by the beginning of May, if the seeds were good, the plants will come up. If the month of April should prove very dry, as it often happens, the beds may have now and then a gentle watering, which will help to bring the plants up. After they have come up, if the summer should not prove very dry, they will require little watering; and even in the greatest drought twice a week will be sufficient for them, provided it be done in the evenings. This is the only care they will require the first summer, except being kept clean from weeds. If the place where they are sown be tolerably well sheltered, they will stand the winter very well, though it should prove severe, as I have many times experienced; but where the situation is not well sheltered by plantations, to break the violence of the frosty black winds, they must be screened, otherwise many will be lost. It is the black frosts, attended by high winds, which destroy these plants; so that where there is not shelter enough to break their edge, the beds should be hooped over, and covered with mats during that severe weather.

The ensuing summer the plants may remain undisturbed, and they will require neither watering, nor farther care, except weeding. The spring following, being then two

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want of air and refreshment, it never arrives to any perfection, but is exceedingly troublesome and chargeable to maintain; whereas, indeed, there is not a more tonfile and governable plant in nature; for the Cypress may be cut to the very roots, and yet spring afresh, as it does constantly in Candy; if not yielding suckers, as Bellonius affirms, I rather think it is produced by the seeds, which the mother-trees shed at the motion of the stem in the felling: And this we find was the husbandry in the Isle of Ænaria, where they used to fell it for copse. For the Cypress being raised in the nursery from seeds sown in September, or rather March, and within two years after transplanted, should at two years standing more, have the master-stem of the middle shaft cut off some hand-breadths below the summit; the sides and smaller sprigs shorn into a conic or pyramidal form, and so kept clipped from April to September, as oft as there is occasion; and by this regimen they will grow furnished to the foot, and become the most beautiful trees in the world, without binding or stake, still remembering to abate the middle stem, and to bring up the collateral

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years old, they should be set out in the nursery, exactly at two feet square. In taking them out of the seed-bed, some earth should be taken with the roots. The latter end of March is the most proper time for this work; and if the weather should prove dry and cold, as it often happens, the March winds blowing, the work must be deferred till rainy or cloudy weather; for without these precautions you will find this a difficult plant to remove. After they are planted out into the nursery they may be now and then watered in dry weather, and kept clean from weeds; thus they may stand till they are of a sufficient size to be planted out for good.

The ground intended for a *Cupressetum* may the preceding year bear a crop of grain, and the winter before it is planted should be plowed with a strong plow, to destroy the weeds, and lay the best soil downwards.

After this, holes should be made all over it at two yards distance. The plants must be taken out of the nursery with as much mould to the roots as possible, and carefully planted in these holes. If the plants are designed for timber, when they get too close they ought to be proportionably thinned; and should undergo a second thinning as often as they touch each other, till they arrive at their full size.

With regard to the Small Blue-berried and Cape Cypresses, the seeds should be sown in pots or boxes. We receive them from abroad; They are very small, and seldom come up before the second spring; so that there will be less danger of their being lost if they are sown in pots or boxes, which may be set in the shade in summer, and removed into well-sheltered places during the winter. In the spring the plants will come up; and after that the Blue-berried Cypress may have the same treatment as the young seedlings of the common sort. With respect to the Cape Cypress, the plants must be set in pots, to be housed in winter, until they are grown to be a yard high. When

branches in its stead, to what altitude you please: But when I speak of shortening the middle shoot, I do not intend the dwarfing of it; and therefore it must be done discreetly, so as it may not over hastily advance, till the foot thereof be perfectly furnished. But there is likewise another, no less commendable expedient, to dress this tree with all the former advantages; if sparing the shaft altogether, you diligently cut away all the forked branches, reserving only such as radiate directly from the body, which being shorn, and clipt in due season, will render the tree very beautiful; and though more subject to obey the shaking winds, yet the natural spring of it does immediately redress it, without the least discomposure; and this is a secret worth the learning of gardeners, who subject themselves to the trouble of stakes and binding, which is very inconvenient. Thus

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they are turned out into the open air, they should have a dry, warm soil, and a well-sheltered place, and even then we cannot ensure their safety.

The Cypress is a native of Crete; and Theophrastus informs us that it grows spontaneously upon mount Ida. Virgil properly calls it the Idæan Cypress:

————— nec Idæis Cuparissis.

GEORG. ii.

Branches of Cypress used antiently to be placed before the doors of the deceased, and Servius gives the reason, “*quia hujus generis arbor excisa non renascitur*,” It not only was stationed before the doors, but also at the sepulchres and funeral piles:

Linquenda tellus, et domus, et placens

Uxor, neque harum, quas colis, arborum.

Te, præter invisas Cupressos,

Ulla brevem dominum sequetur.

HOR.

Lucan informs us that the Cypress was only used at the funerals of persons of distinction, which circumstance is rather singular, as branches of that tree could be procured at a small expence: He says,

Et non plebeios luctus testata Cupressus.

LIB. ii.

Virgil introduces the Cypress at the funeral of Polydore:

————— *stant manibus aræ,*

Cæruleis mæstæ vittis atraque Cupresso.

ÆN. iii.

It is also mentioned at the funeral pile of Misenus:

Ingentem struxere pyram: cui frondibus atris

Intexunt latera, et fœdales ante Cupressos

Constituunt, decorantque super fulgentibus armis.

ÆN. vi.

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likewise may you form them into hedges, topiary works, limits and boundary—*Metas imitata Cupressus*—or by sowing the seeds in a shallow furrow, and plucking up the supernumeraries, where they come too close and thick: for in this work it will suffice to leave them within a foot of each other; and when they are risen about a yard in height (which may be to the half of your palisado) cut off their tops, as you are taught, and keep the sides clipped, that they ascend but by degrees, and thicken at the bottom as they climb. Thus they will present you (in half a dozen or eight years) with incomparable hedges, because they are perpetually green, able to resist the winds better than most which I know, the Holly only excepted, which indeed has no peer.

5. For when I say winds, I mean their fiercest gusts, not their cold: For though it be said, *Brumæque illæsa Cupressus*, and that indeed no frost impeaches them, (for they grow even on the snowy tops of Ida) yet our cruel eastern winds do sometimes mortally invade those which have been late clipped, seldom the untouched, or that were dressed in the spring only. The March and April winds, (in the years 1663 and 1665) accompanied with cruel frosts and cold blasts, for the space of more than two months, night and day, did not, amongst near a thousand Cypresses growing in my garden, kill above three or four, which, for being very late cut to the quick, (that is, the latter end of October) were raw of their wounds, took cold, and gangrened; some few others, which were a little smitten towards the tops, might have escaped all their blemishes, had my gardener capped them but with a wisp of hay or straw, as in my absence I commanded. As for the frost of those winters, (than which I believe there was never known a more cruel and deadly piercing one since England had a name) it did not touch a Cypress of mine, till it joined forces with that destructive wind: Therefore, for caution, clip not your Cypresses late in autumn, and clothe them, if young, against these winds; for the frosts they only discolour them, but seldom or never hurt them, as by long experience I have found; nor altogether despair of the resurrection of a Cypress, subverted by the wind, for some have redressed themselves; and one (as Ziphilinus mentions) rose the very next day, which happening about the reign of the Emperor Vespasian, was esteemed an happy omen. But of such accidents more hereafter.

6. If you affect to see your Cypress in standard, and grow wild (which may in time come to be of a large substance, fit for the most immortal of

timber, and indeed are the least obnoxious to the rigours of our winters, provided you never clip or disbranch them) plant of the reputed male sort; it is a tree which will prosper wonderfully where the ground is hot and gravelly, though, as we said, be nothing so beautiful; and it is of this that the Venetians make their greatest profit.

7. I have already shewed how this tree is to be raised from the seed; but there was another method amongst the antients, who, as I told you, were wont to make great plantations of them for their timber: I have practised it myself, and therefore describe it.

8. If you receive your seed in the roundish small nuts, which use to be gathered thrice a-year, but seldom ripening with us, expose them to the sun till they gape, or near a gentle fire, or put them in warm water, as was directed in those of Cedar, by which means the seeds will be easily shaken out; for if you have them open before, they do not yield you half their crop. About the beginning of April, or before, if the weather be showery, prepare an even bed, which being made of fine earth, clap down with your spade, as gardeners do for purselain-seed (of old they rolled it with a stone or cylinder); upon this strew your seeds pretty thick, then sift over them some more mould, somewhat better than half an inch in height. Keep them duly watered after sun-set, unless the season do it for you; and after one year's growth, for they will be an inch high in little more than two months, you may transplant them where you please. If in the nursery, set them at a foot or eighteen inches distance in even lines, keeping them watered and moist till they are rooted, and fit to be removed. In watering them I give you this caution, which may also serve you for most tender and delicate seeds, that you bedew them rather with a broom or spergitory, than hazard the beating them out with the common watering-pot; and when they are well come up, be but sparing of water. Be sure likewise that you cleanse them when the weeds are very young and tender, lest, instead of purging, you quite eradicate your Cypress. We have spoken of watering; and indeed, whilst young, if well followed, they will make a prodigious advance. When that long and incomparable walk of Cypress at Frascati, near Rome, was first planted, they drew a small stream (and indeed *irrigare* is properly thus, *aquam inducere riguis*, i. e. in small gutters and rills) by the foot of it (as the water there is in abundance tractable) and made it, as I was credibly informed, arrive to

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seven or eight feet height in one year, which does not agree with the epithet, *lenta Cupressus*; but with us we may not be too prodigal, since, being once well taken, they thrive best in our sandy, light, and warmest grounds; whence Cardan says, *juxta aquas arefcit*; meaning in low and moorish places, stiff and cold earth, &c. where they never thrive.

9. There is also a Virginian Cypress, of an enormous height, beautiful and very spreading, the branches and leaves large and regular, with the clogs resembling the Cypress; and though the timber be somewhat coarse and cross-grained, it is, when polished, very agreeable, as I can shew in a very large table made out of the planks of a Spur only; and have experience of its lastingness, though exposed both to the air and weather.

10. What the uses of this timber are, for chests and other utensils, harps, and divers other musical instruments (it being a very sonorous wood, and therefore employed for organ-pipes, as heretofore for supporters of vines, poles, rails, and planks, resisting the worm, moth, and all putrefaction to eternity) the Venetians sufficiently understood; who did every twentieth year, and oftener, (the Romans every thirteenth) make a considerable revenue of it out of Candy: And certainly a very gainful commodity it was, when the fell of a Cupressetum was heretofore reputed a good daughter's portion, and the plantation itself called *Dos filie*. But there was in Candy a vast wood of these trees, belonging to the republic, by malice or accident (or perhaps by solar heat, as were many woods, seventy-four years after, even here in England) set on fire, which, beginning *Anno* 1400, continued burning for seven years before it could be quite extinguished, being fed for so long a space by the unctuous nature of the timber, of which there were to be seen at Venice planks of above four feet in breadth: And formerly the valves of St. Peter's church at Rome were framed of this material, which lasted from the great Constantine to Pope Eugenius IVth's time, (eleven hundred years) and then were found as fresh and entire as if they had been new. But this Pope would needs change them for gates of brass, which were cast by the famous Antonio Philarete; not in my opinion so venerable as those of Cypruses. It was in coffins of this material that (as Thucydides tells us) the Athenians used to bury their heroes: And the Mummy-chests brought with those condited bodies out of Egypt, are many of them of this material, which, it is probable, may have lain in those dry and sandy Crypta many thousand years.

11. The timber of this wood was of infinite esteem with the antients. That lasting bridge built over the Euphrates by Semiramis, was made of this material; and it is reported Plato chose it to write his laws on, before brass itself, for the diuturnity of the matter. It is certain that it never rifts or cleaves but with great violence; and the bitterness of its juice preserves it from all worms and putrefaction. To this day those of Crete and Malta make use of it for their buildings, because they have it in plenty; and there is nothing outlasts it, or can be more beautiful, especially than the root of the wilder sort, incomparable for its crisped undulations. Divers learned Persons have conceived the Gopher mentioned in holy writ, Gen vi. 14. (and of which the ark was built) to have been no other than this *Κυπάρισσος*, Cupar, or Cuper, by the easy mutation of letters. Aben Ezra names it a light wood apt to swim; so does David Kimchi, which rather seems to agree with Fir or Pine, and such as the Greeks call *ξύλα τετράγωνα* quadrangular trees, about which Critics have made a deal of stir; but Isa. Vossius, on the LXX. cap. xi. has sufficiently made it out, that the timber of that denomination was of those sort of trees whose branches break out just opposite to one another at right angles, which makes it appear to have been Fir, or some sort of wood whose arms grow in an uniform manner; but surely this is not to be universally taken, since we find that Yew, and divers other trees, brittle, heavy, and unapt for shipping, do often put forth in that order. The same learned Author will have Gopher to signify only pitch or bitumen, as much as if the text had said, make an ark of resinous timber. The Caldee paraphrase translates it Cedar; or, as Junius and Tremellius, Cedrelaten, a species between Fir and Cedar. Munster contends for the Pine, and divers able divines endeavour to prove it Cypress; and, besides, it is known that in Crete they employed it for the same use in the largest contignations, and did formerly build ships of it: And Epiphanius Hæres. lib. i. tells us, some reliicks of that ark, *circa Campos Sennaar*, lasted even to his days, and was judged to have been of Cypress. Some indeed suppose that Gopher was the name of a place, à *Cupressis*, as *Elon*, à *Quercubus*, and might possibly be that which Strabo calls *Cupressetum*, near Adiabene in Assyria. But for the reason of its long lasting, coffins (as noted) for the dead were made of it, and thence it first became to be *Diti sacra*; and the valves, or doors, of the Ephesine temple were likewise of it, as we observed but now, were those of St. Peter's at Rome.

BOOK II. Works of Cypress-wood, *permanent ad diuturnitatem**, says Vitruvius, lib. iii.
 And the Poet,

—perpetua nunquam moritura Cupressō.

MART. Lib. vi. 73.

The medical virtues of this tree, are for all affects of the nerves, astringent and refrigerating, for the hernia, applied outwardly; or, taken inwardly, for the dysentery, strangury, &c.

12. But to resume the disquisition, whether it be truly so proper for shipping, is controverted; tho' we also find in Cassiodorus Var. Op. l. v. epist. xvi, Theodoric writing to the Prætorio-præfectus that he had caused store of it to be provided for that purpose; and Plato, who, we told you, made laws and titles to be engraven on it, nominates it, *inter arbores ναυπηγικῶς utiles*, lib. iv. Leg. and so does Diodorus, lib. xix. And, as travellers observe, there is no other sort of timber more fit for shipping, though others think it too heavy. Aristobulus affirms that the Assyrians made all their vessels of it; and indeed the Romans praised it, when pitched

N O T E S.

* The Antients considered the Cypress as a wood not subject to decay. Martial, in the forty-ninth Epigram of the sixth Book, introduces Priapus, speaking of himself, as not being made of common wood, but of *incorruptible* Cypress.

Nōn sum de fragili dolatus ulmo.

Nec quæ stat rigida supina vena.

De ligno mihi quolibet columna est.

Sed viva generata de Cupressō :

Quæ nec sæcula centies peracta.

Non longæ cariem timet senectæ.

This God was considered as the Guardian of Vineyards and Gardens. He was cut out of any rough piece of wood into an extraordinary form; and being dressed up with reeds on his head, and a scythe in his right hand, (Virg. Georg. iv.) was placed in gardens to terrify birds and thieves. Horace thus describes him :

Olim truncus eram ficulnus, inutile lignum ;

Cum faber, incertus scamnum faceretne Priapum,

Maluit esse Deum. Deus inde ego, furum aviumque

Maxima formido : nam fures dextra coercet,

Obscœnoque ruber porrectus ab inguine palus.

Ast importunas volucres in vertice arundo

Terræ fixa, vetatque novis confidere in hortis.

Lib. i. Sat. viii.

with Arabian pitch. And so frequent was this tree about those parts of Assyria, where the ark is conjectured to have been built, that those vast Armadas which Alexander the Great caused to be equipped and set out from Babylon, consisted only of Cypress, as we learn out of Arrian in Alex. lib. vii. And Strabo, lib. xvi. Plutarch. Sympof. lib. i. prob. c. ii. Vegetius, lib. iv. cap. xxxiv. &c. Paulus Colomesius, in his *Κεμνήλια* Literaria, cap. xxiv. perstringes the most learned If. Vossius, that, in his Vindicie pro LXX. Interp. he affirms Cypress not fit for ships, as being none of the *τελείωνοι*. But, besides what we have produced, Fuller, Bochartus, Lilius Gyraldus, lib. de Navig. cap. iv. and divers others, sufficiently evince it; and that the vessel built by Trajan was of that material, lasting uncorrupt near 1400 years, when it was afterwards found in a certain lake; if it were not rather, as I suspect, that which Æneas Silvius reports to have been discovered in his time, lying under water in the Numidian Lake, crufted over with a certain ferruginous mixture of earth and scales, as if it had been of iron; but, as we have elsewhere noted, it was pronounced to be Larix, and not Cypress, employed by Tiberius.—Finally, not to forget even the very chips of this precious wood, which give that flavour to muscadines and other rich wines, I commend it for the improvement of the air, and a specific for the lungs; as sending forth most sweet and aromatic emissions whenever it is either elipped or handled; and the chips or cones being burnt, extinguish moths, and expel the gnats and flies, &c. not omitting the gum which it yields; not much inferior to the Terebinthine or Lentisc.

We have often mentioned the virtue of these odoriferous woods for the improvement of the air, upon which I take occasion here to add what I have, some years since, already * published concerning the melioration of it, in and about this great and populous city, accidentally obnoxious to the effects of those nauseous vapours exhaling from those many unclean places, and tainting that dismal cloud of sulphureous, if not arsenical, smoak which we incessantly breathe in. I know the late terrible conflagration, by the care and industry of the magistrate in causing so many kennels, sinks, gutters, lay-stalls, and other nuisances (receptacles of a stagnant filth) to be removed, must needs have exceedingly contributed to the purifying of the air, as I am persuaded would appear upon a political observation in the bills of mortality. But what I cannot yet but deplore, is, that when that spacious area was so long a *rasa tabula*, the churchyards had not been banished to the north walls of the city, where a grated

* Fumifugium.

BOOK II. inclosure of competent breadth, for a mile in length, might have served for an universal cœmety to all parishes, distinguished by the like separations, and with ample walks of trees; the walks adorned with monuments, inscriptions, and titles, apt for contemplation and memory of the defunct; and that wise and antient law of the twelve tables restored and revived. But concerning this, and Hortulan burials, see chap. i. book iv. Happy, in the mean time, had it been for the further purgation of this august metropolis, had they then banished and proscribed those hellish vulcanos, disgorging from the brew-houses, soap and salt-boilers, chandlers, hat-makers, glass-houses, forges, lime-kilns, and other trades, one of whose funnels vomits more smoak than all the culinary and chamber-fires of a whole parish, perniciously infecting the ambient air with a black melancholy canopy, to the detriment of the most valuable moveables and furniture of the inhabitants, and the whole country around. A bar of iron shall be more exed and consumed with rust in one year in this city, than in thrice seven in the country. Why might it not therefore be worth a severe and public edict to remove these vulcanos, and infernal houses of smoak, to a competent distance; some down the river; others, which require conveniency of fresh water, up the Thames, among the streams about Wandsworth, &c. their commodities and manufactures brought up to capacious wharfs on the bank, or London side, to the increase of a thousand watermen and other labourers, of whom we cannot have too many?

Now, to demonstrate that the amoval of these unsufferable nuisances would infinitely clarify the air and render it more wholesome, I shall return to my subject of trees and plants. The reputation they have had for contributing to the health of whole countries and cities, frequently occurs in history. For instance, the island of Cyprus, abounding with the trees of that name, and other resinous plants, cures ulcerated lungs, &c. Sardinia, replanted with true Anticyran Hellebore, was famous for curing melancholy and madness; whilst Thufus (especially in summer) brought almost all the inhabitants to lunacy and distraction for want of it. And what effects and benefits such plantations have produced, is conspicuous in one of the most celebrated cities of the east, the famous Ispahan, cleared of the pestilence since the surrounding it with the beautiful Platan, as I have already noted. To these add the Bay-tree for abating all such infections; of which see many famous instances in chap. vi. to which I refer. Nor that there are no nociferous trees, as well as saniferous, which,

by removing the one, and planting the other in their places, make sensible changes for the better. I shall give instances, when we speak of the Yew, and even that otherwise incomparably useful shrub, the Elder.

Upon what, therefore, has been produced of expedients for the melioration of the air by plantations of proper trees, I cannot but wish, that since these precious materials may now be had at such tolerable rates, as certainly they might from Cape-Florida, the Vermuda, or other parts of the West-Indies, I say, I cannot but suggest, that our more wealthy citizens of London, every day building and embellishing their dwellings, might be encouraged to make use of Cypress-wood in their shops, at least for shelves, counters, chests, tables, wainscot, the fencings, as they term it, and mouldings; since, besides the everlastingness of the wood, enemy to worms, and those other corruptions we have named, it would likewise greatly cure and reform the malignancy and corrosiveness of the air.

S A V I N E*.

The Sabin, or, as we call it, Savine, is not for dignity to be named with the former; but as it is absolutely the best succedaneum to Cypress, (which the rigour of our climate is not benign to) our gardeners would do well to increase and cultivate it for the other's defects, and bring up nurseries of them for pyramids, and other conical and topiary works. As to its other quality, it has, indeed, an ill report, as most other things have when not rightly applied, whilst there is nothing more efficacious for the destruction of worms in little children, the juice being given in a spoonful of milk, dulcified with a little sugar, which brings them away in heaps, as it does in horses and other cattle, above all other remedies.

There is another berry-bearing Savine in warmer climates, which also resembles the Cypress, commonly taken for the Tarrentine Cypress, so much celebrated by Cato, which grew to noble standards. But that and the Melesian, worthy the culture, are rare with us, and indeed is as well supplied by the more hardy, as well as the Swedish Juniper, and other shrubs.—The Sabine is easily propagated by slips and cuttings, sooner than by the seeds, which are sometimes found in the small squamous seed-cases.

N O T E S.

* The Savin is a species of Juniper, and has been described in the last chapter, under the title of *Juniperus* (Sabina) *foliis oppositis erectis decurrentibus, ramis patulis*.

Book II.

TAMARISC*.

The Tamarisc, (growing to a considerable tree) for its aptness to be thorn, and governed like the Sabine and Cypress, may be entertained, but not for its lasting verdure, which forsakes it in winter, tho' it is soon again restored. But it has other excellent properties; in particular, it is

* Elizab.

sovereign against the spleen, which, as * Camden tells us, was therefore brought first into England by Grindal, Archbishop of Canterbury. They also made cans of this wood to drink out of. It was of old counted infe-

NOTES.

* There are two species of this genus.

1. TAMARIX (*Gallica*) floribus pentandris. H. Cliff. III. *Tamarisk with flowers having five stamina.* Tamariscus Narbonensis. Lob. Icon. 218. *French Tamarisk.*

This sort grows naturally in the south of France, in Spain and Italy, where it arrives to a tree of middling size; but in England is seldom more than fourteen or sixteen feet high. The bark is rough, and of a dark brown colour; it sends out many slender branches, most of which spread out flat and hang downward at their ends; these are covered with a Chestnut-coloured bark, and garnished with very narrow finely-divided leaves, which are smooth, of a bright green colour, and have small leaves or indentures which lie over each other like scales of fish. The flowers are produced in taper spikes at the end of the branches, several of them growing on the same branch. The spikes are about an inch long, and as thick as a large earth-worm. The flowers are set very close all round the spike; they are very small, and have five concave petals of a pale flesh-colour, with five slender stamina terminated by roundish red summits. The flowers appear in July, and are succeeded by oblong, acute-pointed, three-cornered capsules, filled with small downy seeds, which seldom ripen in England.

2. TAMARIX (*Germanica*) floribus decandris. Hort. Cliff. III. *Tamarisk whose flowers have ten stamina.* Tamariscus Germanica. Lob. Icon. 218. *German Tamarisk.*

This kind grows naturally in Germany, in moist land: It is rather a shrub than a tree, having several ligneous stalks arising from the same root, which grow erect, sending out many side-branches which are also erect; these have a pale green bark when young, which afterwards changes to a yellowish colour. The leaves are shorter, and set closer together than those of the other sort, and are of a lighter green, approaching to a gray colour; the flowers are produced in long loose spikes at the end of the branches, standing erect; they are larger than those of the former, and have ten stamina standing alternately. It flowers about the same time as the former.—Both these sorts cast their leaves in autumn, and it is pretty late in the spring before the young leaves push out, which renders them less

lix, and under malediction; and therefore used for wreaths to be put on CHAP. III.
the heads of malefactors.

THUYA*.

This tree, by some called *Arbor Vitæ*, (brought from Canada) is of moderate stature, bearing a ragged leaf not unlike the *Cypress*, only somewhat flatter, and not so thick set and close. It is of a hardy green all the winter, (though a little tarnished in very sharp weather) and bears small longish clogs and seeds (but takes much better by layers and slips) as those we have before mentioned, and may be kept in the same shapes, but most delights in the shade, where the roots running shallow, the stem needs support. The leaf being bruised between the fingers emits a powerful scent, not easily conquered, seeming to breathe something of a fanative

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valuable; they are now frequently planted in gardens for ornament, and, when mixed with other shrubs, make a pretty variety.

This genus of plants is of the class and order *Pentandria Trigynia*.

The culture of both sorts of *Tamarisk* is very easy: Every cutting will grow that is set in winter, and will be a good plant by the autumn following. The encreasing of them by layers has been recommended; but this is bad advice, not only as being unnecessary trouble, when they will grow so freely by cuttings, but because layers of this tree very often will not strike root at all. The best time for the work is October, though any time of the winter will do. The cuttings should be of the last summer's shoot; and a moist part of the garden is most eligible for them to be planted in. In two years they will be good plants for the wilderness or shrubbery, and may then be planted out in almost any soil, though they best like a light moist earth, especially the German fort; for in countries where it grows naturally it is generally found in low watery grounds.

* Of the *THUYA* there are two Species.

1. *THUYA (Occidentalis)* *strobilis lævibus, squamis obtusis*. H. Cliff. 449. *Thuya* with smooth cones and obtuse scales. *Thuya Theophrasti*. C. B. P. 488. *The common Arbor Vitæ*.

This sort grows naturally in Canada, Siberia, and other northern countries, and has been long an inhabitant in the English gardens. In some of these gardens, which have not been altered, there are a few of these trees which are of a large size: The *Thuya* has a strong woody trunk, which rises to the height of thirty

Book II. ointment, and (as I am told) makes one of the best for the closure of green and fresh wounds. But that those curious utensils and works of the Turner, bowls, boxes, cups, mortars, pestles, &c. are of this material, as is pretended, is a mistake; being rather of some of the exotic more close and ponderous woods, as Brasil, Logwood, &c. Upon recension therefore of these exotics, I cannot but encourage the more frequent raising the rest of those Semper-vivents, especially such as are fittest for the shrubby parts and furniture of our groves, mere gardens of pleasure, which none but the Evergreen become. To these we might add (not for their verdure only) other more rare exotics, *Styrax Arbor* and *Terebynth*; noting, by the way, that we have no true turpentine to be bought in our shops, but what is from the Larch, whilst apothecaries substitute that which extils from the Fir-tree instead of it: All of them minding me again of the great opportunities and encouragement we have of every day improving

N O T E S.

feet or more. The bark, while young, is smooth, and of a dark brown colour, but, as the trees advance, the bark becomes cracked and less smooth. The branches are produced irregularly on every side, standing almost horizontal, and the young slender shoots frequently hang downward; these branches stand but thin, and the younger branches only are garnished with leaves, so that when the trees are grown large, they make but an indifferent appearance, being so thinly clothed with leaves. The young branches are flat, and the small leaves are placed imbricatum over each other like the scales of fish; the flowers are produced from the side of the young branches, pretty near to the foot-stalk; the male flowers grow oblong catkins, and between these the female flowers are collected in form of cones. When the former have shed their farina, they soon after drop off, but the female flowers are succeeded by oblong cones, having obtuse smooth scales, containing one or two oblong seeds. It flowers early in the spring, and the seeds ripen in September. The leaves of this tree have a rank oily scent when bruised. Professor Kalm informs us that this tree is not seen farther south than Saratoga in the Province of New York, which place is forty-two degrees and ten minutes north latitude. The Canadians call it *Cedre blanc*. In its natural state it seems to prefer swamps, marshes, and other wet places, where it grows the best. In Canada the tallest trees do not exceed thirty-six feet.

2. *THUYA (Orientalis) strobilis squarrosi, squamis acuminatis reflexis.* Hort. Upsal. 289. *Thuya with rugged cones, and acute-pointed reflexed scales.* *Thuya strobilis uncinatis, squamis reflexo-acuminatis.* Flor. Leyd. Prod. 87. *The China Arbor Vitæ.*

This kind grows naturally in the northern parts of China, where it rises to a considerable height. The seeds were first sent to Paris by some of the Missionaries, and there are some of the trees growing in the gardens of some curious persons.

our stores with so many useful trees from the American plantations, for which I have the suffrage of the often-cited Mr. Ray, who is certainly a very able judge. Might we not therefore attempt the more frequent Locust, Sassafras, and that sort of Elm, or Sugar-tree, whose juice yields that sweet? Also the *Halymus Latifolius*, and several others, for encouragement. But,

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there, which are more than twenty feet high. The branches of this sort grow closer together, and are much better adorned with leaves, which are of a brighter green colour, so make a much better appearance than the other; being very hardy, it is esteemed much preferable to most of the evergreen trees with small leaves, for ornament in gardens. The branches of this tree cross each other at right angles; the leaves are flat, but the single divisions of the leaves are slender, and the scales are smaller, and lie closer over each other than those of the first sort. The cones are also much larger, and of a beautiful gray colour; their scales end in acute reflexed points.

In the Linnæan system this tree is of the class and order *Monœcia Monadelphica*. The flowers come out early in the spring, but make a mean appearance.

The *Arbor Vitæ* is propagated by seeds, layers, and cuttings. The first method makes the best trees, though the latter are generally practised.

The celebrated Professor Kalm, in his Travels into North-America, observes of the Occidental *Arbor Vitæ*, that it is reckoned the most durable wood in Canada: "In-
" closures of all kinds are made of it. All the posts which are driven into the ground,
" are of the *Thuya* wood. The palisades round the forts in Canada are likewise made
" of the same wood. The planks in the houses are made of it; and the thin narrow
" pieces of wood which form both the ribs and the bottom of the bark-boats, com-
" monly made use of here, are taken from this wood, because it is pliant enough for
" the purpose, especially whilst it is fresh, and likewise because it is very light. The
" *Thuya* wood is reckoned one of the best for the use of lime-kilns. Its branches are
" used all over Canada for besoms; and the twigs and leaves of it being naturally bent
" together, seem to be very proper for the purpose. The Indians make such besoms,
" and bring them to the towns for sale; nor do I remember having seen besoms of
" any other wood. The fresh branches have a peculiar scent, which is strongly per-
" ceived in houses where they make use of besoms of this tree.

" This *Thuya* is made use of for several medicinal purposes. The Commandant
" of Fort St. Frederic, M. de Lusignan, could never sufficiently praise its excellence for
" rheumatic pains. He told me he had often seen it tried, with remarkable success,

BOOK II.

I produce not these particulars, and other *amena vireta* already mentioned, as signifying any thing to timber, the main design of this treatise; (though I read of some Myrtles so tall as to make spear-shafts) but to exemplify in what may be farther added to ornament and pleasure, by a cheap and most agreeable industry.

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“ upon several persons, in the following manner: The fresh leaves are pounded in a
 “ mortar, and mixed with hog’s greafe, or any other greafe. This is boiled together
 “ till it becomes a salve, which is spread on linen, and applied to the part where the
 “ pain is. The salve gives certain relief in a short time. Against violent pains,
 “ which move up and down in the thighs, and sometimes spread all over the body,
 “ they recommend the following remedy: Take of the leaves of a kind of Polypody*
 “ four-fifths, and of the cones of the Thuya one-fifth, both reduced to a coarse pow-
 “ der by themselves, and mixed together afterwards. Then pour milk-warm water
 “ on it, so as to make a poultice, which spread on linen, and wrap it round the body;
 “ but as the poultice burns like fire, they commonly lay a cloth between it and the
 “ body, otherwise it would burn and scorch the skin. I have heard this remedy prai-
 “ sed beyond measure, by people who said they had experienced its good effects. An
 “ Iroquesse Indian told me, that a decoction of Thuya leaves was used as a remedy for
 “ the cough. In the neighbourhood of Saratoga, they use this decoction in the in-
 “ termitting fever.

“ This tree has, in common with many other American trees, the quality of grow-
 “ ing freely in marshes and thick woods, which may be with certainty called its
 “ native places. However, there is scarce a single Thuya tree in those places which
 “ bears seeds; if, on the other hand, a tree accidentally stands on the outside of a
 “ wood, on the sea-shore, or in a field, where the air can freely come at it, it is al-
 “ ways full of seeds. I have found this to be the case with the Thuya, on innume-
 “ rable occasions.”

* Polypodium fronde pinnata, pinnis alternis ad basin superne appendiculatis.



The Oriental Plane Tree.

Published Jan^y 1779 by A. Hunter M.D. as the Act directs.

J. Miller del. & J. Stulp.

CHAP. IV.

The PLATANUS*, LOTUS, CORNUS, and ACACIA.

PLATANUS. This beautiful and precious tree, antiently sacred to Helena (and with which she crowned the Lar and Genius of the place) was so deoted on by Xerxes, that Ælian and other Authors tell us he made halt, and stopped his prodigious army of seventeen hundred thousand soldiers, which even covered the sea, exhausted rivers, and thrust mount Athos from the continent, to admire the pulcritude and procerity of one of them; and became so fond of it, that, spoiling both himself, his concubines, and great persons of all their jewels, he covered it with gold, gems, necklaces, scarfs and bracelets, and infinite riches: In sum, was so enamoured of it, that for some days neither the concernment of his grand expedition, nor interest of honour, nor the necessary motion of his portentous army, could persuade him from it: He stiled it his Mistress, his Minion, his Goddess; and when he was forced to part from it, he caused the figure of it to be stamped on a medal of gold, which he continually wore about him. Wherever they built their sumptuous and magnificent colleges for the exercise of youth in Gymnastics, as Riding, Shooting,

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NOTE S.

* Of this Tree there are only two Species.

I. PLATANUS (*Orientalis*) foliis palmatis. Hort. Cliff. 447. *Plane-tree with hand-shaped leaves.* Platanus Orientalis verus. Park. Theat. 1427. *The true Eastern Plane-tree.*

This kind grows naturally in Asia, where it becomes very large; the stem is tall, erect, and covered with a smooth bark, which annually falls off; it sends out many side-branches, which are generally a little crooked at their joints; the bark of the young branches is of a dark brown, inclining to a purple colour; they are garnished with leaves placed alternate; their foot-stalks are an inch and a half long; the leaves are seven inches long and eight broad, deeply cut into five segments, and the two outer are slightly cut again into two more; these segments have many acute indentures on their borders, and have each a strong midrib, with many lateral veins running to the sides; the upper side of the leaves is of a deep green, and the under side pale.—Dionysius, the Geographer, compares the form of the Morea, or antient Peloponnesus, to the leaves of this tree, making the foot-stalk to be the Isthmus by which it is joined to Greece. The flowers come out upon long foot-stalks or ropes hanging downward, each sustaining

Book II. Wrestling, Running, &c. (like to our French Academies) and where the graver Philosophers also met to converse together and improve their studies, betwixt the Xista and Subdiales ambulationes (which were portico's open to the air) they planted groves and walks of Platans, to refresh and shade the Palæstritæ, as you have them described by Vitruvius, lib. v. cap. xi.

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five or six round balls of flowers; the upper, which are the largest, are more than four inches in circumference; these fit very close to the foot-stalks. The flowers are so small as scarce to be distinguished without glasses; they come out a little before the leaves, which is in the beginning of June; and in warm summers the seeds will ripen late in autumn, and if left upon the trees will remain till spring, when the balls fall to pieces, and the bristly down which surrounds the seeds helps to transport them to a great distance with the wind.

2. *PLATANUS (Occidentalis) foliis lobatis.* Hort. Cliff. 447. *Plane-tree with lobated leaves.* *Platanus Occidentalis* & *Virginienfis.* Park. Theat. 1427. *Occidental or Virginian Plane-tree.*

This sort is naturally produced in most parts of North-America; it grows to a large size, with a straight stem of equal girth most part of the length; the bark is smooth, and annually falls off like that of the other; the branches extend wide on every side; the young ones have a brownish bark, but on the old ones it is gray; the foot-stalks of the leaves are three inches long; the leaves are seven inches long, and ten broad; they are cut into three lobes or angles, and have several acute indentures on their borders, with three longitudinal midribs, and many strong lateral veins. The leaves are of a light green on their upper side, and paler on their under. The flowers grow in round balls like the former, but are smaller. The leaves and flowers come out at the same time with the former, and the seeds ripen in autumn.

The *Platanus* is of the class and order *Monœcia Polyandria*.

The flowers come out late in the spring, and are so small as scarcely to be visible to the naked eye. The buds of the leaves of the oriental sort begin to swell about the fourteenth of April, and the leaves are generally out by the latter end of the same month.

Besides the two species already described there are two varieties: 1. The Spanish Plane-tree; 2. The Maple-leaved Plane-tree.

The Spanish Plane-tree has larger leaves than either of the other sorts; they are more divided than those of the Occidental, but not so much as the Eastern. Some of the leaves are cut into five and others into three lobes; these are sharply indented on the edges, and are of a light green; the foot-stalks are short, and covered with a short down. This is by some called the Middle Plane-tree, from its leaves being shaped



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and as Claudius Perrault has assisted the text with a figure or ichnographical plot. These trees the Romans first brought out of the Levant, and cultivated with so much industry and cost, for their stately and proud heads only, that the great Orators and Statesmen, Cicero and Hortensius, would exchange now and then a turn at the bar, that they might have the pleasure to step to their villas, and refresh their Platans, which they would often irrigate with wine instead of water: *Crevit Et affuso latior umbra mero.* And so prized was the very shadow of this tree, that when afterwards they transplanted it into France, they exacted a *Solarium*, by way of tribute, of any of the natives who should presume but to put his head under it.

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between those of the two other sorts. It grows rather faster than either of the other kinds.

The Maple-leaved Plane-tree differs from the two genuine species, in having its leaves not so deeply cut as the Eastern, nor lobed as the Western kind. The foot-stalks of the leaves are much longer than those of the above sorts, and the upper surface of the leaves is rougher.

The Oriental and Spanish Plane-trees are propagated from seeds, when they can be procured; but whoever enjoys not this convenience, must have recourse to layers. The ground proper for the seminary should be moist and shady, well dug, and raked till the mould is fine; then, in the autumn, soon after the seeds are ripe, let them be scattered over this ground, and the seeds raked in, in the same manner as turnip-seeds. In the spring many of the young plants will come up, though you must not expect the general crop till the second year; the spring after which they may be taken out of the seminary, and planted in the nursery in rows one yard asunder, and at one foot and a half distance in the rows. Here they may remain, with the usual care of digging between the rows and keeping them clean, till they are of sufficient size to plant out for good.

Where the seeds of these trees cannot be procured, layering must be the method of propagation. For this purpose a sufficient number must be planted out for stools on a spot of earth double dug: After they have stood one year, they should be cut down, in order to make them throw out young wood for layering. The autumn following these should be laid in the ground, with a little nick at the joint; and by that time twelvemonths they will be trees of a yard high, with a good root, ready to be planted out in the nursery, where they may be managed as the seedlings; and as the stools will have shot up fresh young wood for a second operation, this treatment may be continued *ad libitum*.

The Occidental Plane-tree is propagated by cuttings; which if they are taken from strong young wood, and planted early in the autumn, in a moist good mould, will hardly fail of succeeding. They are generally planted thick, and then removed into the nursery-ground, as the layers of the other sort: But if a large piece of moist ground was ready, the cuttings might be placed at such a distance as not to approach

BOOK II.

But whether for any extraordinary virtue in the shade, or other propitious influence issuing from the tree, a worthy Knight, who staid at Isfahan in Persia, when that famous city was infected with a raging pestilence, told me, that since they have planted a greater number of these noble trees about it, the plague has not come nigh their dwellings. Pliny affirms there is no tree whatsoever which so well defends us from the heat of the sun in summer, nor that admits it more kindly in winter. And, for our encouragement, I do, upon experience, assure you, that they will flourish and abide with us, without any more trouble than frequent and plentiful watering, which, from their youth, they excessively delight in, and gratefully acknowledge by their growth accordingly; so as I am persuaded that, with very ordinary industry, they might be propagated to the incredible ornament of the walks and avenues to great men's houses. The introduction of this true Plane among us is, perhaps, due to the great Lord Chancellor Bacon, who planted those (still flourishing ones) at Verulam; as to mine, I owe it to that Honourable Gentleman, the late Sir George Crook, of

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too close before they were of a sufficient size to plant out for good; and this would save the expence and trouble of a removal. The Oriental Plane-tree will grow from cuttings, but not so certainly as this; and whoever has not the convenience of proper ground for the cuttings of either, must have recourse to layers with this tree also; which, indeed, is always the surest and most effectual method.

Plane-trees delight in a moist situation, especially the Occidental sort; where the land is inclined to be dry, and Plane-trees are desired, the other kinds are to be preferred. But in moist places, by the sides of rivulets, ponds, &c. the Occidental makes such surprising progress as induces me to think that it might be ranked amongst the Aquatics, without any impropriety.

The Oriental Plane-tree was greatly respected by the antients for its cooling shade;

Jamque ministrantem Platanum potantibus umbram. VIRG.

And so great was their veneration for it, that in the height of their Enthusiasm they used to refresh its roots with wine instead of water. *Tantumque postea honoris increvit, ut mero infuso enutriantur: compertum id maxime prodesse radicibus; docuimusque etiam arbores vina potare.* PLIN.

In the ACADEMIA, or School of Plato, the Philosophers used to walk and converse together under the shade formed by these delightful trees; to which custom Horace alludes:

Atque inter Silvas Academi quærere verum. Lib. ii. Ep. ii.

Pliny informs us that this tree was first brought over the Ionian Sea, into the Island of Diomedes, for a monument for that Hero: thence into Sicily, and so into Italy, where it has continued ever since to give coolness and refreshment to the inhabitants in the height of summer.

Oxfordshire, from whose bounty I received an hopeful plant now growing in my Villa; nor methinks should it be so great a rarity, if it be true that, CHAP. IV.
being brought from Sicily, it was planted as near us as the Morini.

There was lately at Basil, in Switzerland, an antient goodly Platanum, and now in France they are come again in vogue: I know it was antiently accounted ἀκαρπες; but they may with us be raised of their seeds with care, in a moist soil, as here I have known them. But the reason of our little success is, that we very rarely have them sent us ripe; these should be gathered late in autumn, and brought us from some more Levantine parts than Italy. They come also of layers abundantly, affecting a fresh and feeding ground; for so they plant them about their rivulets and fountains. The West-Indian Plane is not altogether so rare, but it rises to a goodly tree, and bears a very ample and less jagged leaf: That the Turks use their Platanus for the building of ships, I learn out of Ricciolus Hydrog. lib. x. cap. xxxvii. And Pliny informs us that canoes and vessels for the sea have been excavated out of their prodigious trunks.

LOTUS*.

I have the same opinion of the Lotus Arbor, (another lover of the water) which in Italy yields both an admirable shade, and timber immortal, growing to a vast tree, where it comes spontaneously; but its fruit seems not

NOTES.

* Of this tree there are three species.

1. *CELTIS (Australis)* foliis lanceolatis, acuminatis, ferratis, nervosis. Mill. Dict. Nettle tree with spear-shaped pointed leaves, which are veined and sawed on their edges. *Celtis fructu nigricante.* Tourn. Inst. 612. *Lote tree with a black fruit.* Lotus f. *Celtis.* Com. epit. 155. Lotus Arbor. Lob. Ic. 186.

This sort grows naturally in the south of France, in Spain and Italy, in which countries it grows to a tree of considerable size; in England it is not so common as the second kind.—It rises with an upright stem to the height of forty or fifty feet, sending out many slender branches upward, which have a smooth dark-coloured bark, with some spots of gray; these are garnished with leaves placed alternately, which are near four inches long, and about two broad in the middle, ending in long sharp points, and deeply sawed on their edges, having several transverse veins which are prominent on their under-side. The flowers come out from the wings of the leaves all along the branches; they have a male and an hermaphrodite flower generally at the same place, the male flowers being situated above the

Book II. so tempting as it is storied it was to the companions of Ulysses. The first who brought the Lotus out of Virginia, was the late industrious Tra-

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others: these have no petals but a green herbaceous empalement, so make no figure; they come out in the spring, at the same time when the leaves make their first appearance, and generally decay before the leaves have grown to half their magnitude. After the flowers are past, the germen of the hermaphrodite flowers becomes a round berry about the size of a large pea, which is black when ripe.

2. *CELTIS (Occidentalis)* foliis obliquè-ovatis, ferratis, acuminatis. Lin. Sp. Pl. 1478. *Nettle tree with oblique, oval, pointed leaves, which are sawed on their edges. Celtis fructu obscure purpurascente. Mill. Dict. Lote tree with a dark purple fruit. Lotus Arbor Virginiana, fructu rubro. Raii Hist. 1917.*

This grows naturally in North-America; it delights in a moist rich soil, in which it becomes a very large tree. It rises with a straight stem, which in young trees is smooth and of a dark colour, but as they advance it becomes rougher, and of a lighter green. The branches are much diffused on every side, and are garnished with oblique oval leaves, ending in points, and sawed on their edges; they are placed alternately on the branches, with pretty long foot-stalks. The flowers come out opposite to the leaves upon pretty long foot-stalks, the male flowers standing above the hermaphrodite as in the other species; after these decay the hermaphrodite flowers are succeeded by roundish berries, which are smaller than those of the first sort, and, when ripe, are of a dark purple colour. This tree flowers in May, and the seeds ripen in October. Of this sort there are several pretty large-trees in the English gardens, some of which produce great quantities of fruit annually, which, in favourable seasons, come to maturity, so that from these seeds there have been plants raised; and there are few years in which there is not fruit of this sort sent from America, whereby it is now become pretty common in the English nurseries.

3. *CELTIS (Orientalis)* foliis ovato-cordatis, denticulatis, petiolis brevibus. Mill. Dict. *Nettle tree with oval heart-shaped leaves, slightly indented, and short foot-stalks. Celtis orientalis minor, foliis minoribus & crassioribus, fructu flavo. Inf. Cor. 42. Smaller Eastern Lote tree with smaller and thicker leaves, and a yellow fruit.*

This sort was discovered by Dr. Tournefort in Armenia, from whence he sent the seeds to the Royal Garden at Paris, where they succeeded, and the trees, which were there raised, have produced fruit for several years; so that most of the curious gardens in Europe have been furnished with it from thence.—It rises with a stem about ten or twelve feet high, dividing into many branches, which spread horizontally on every side, having a smooth greenish bark, garnished with leaves about an inch and a half long, and near an inch broad, inclining to a heart-shape, but are oblique, one of the ears of the base being smaller and lower than the other; they are of a thicker texture than those of the common sort, and

descant. Of this wood are made pipes, and wind instruments; and of its root, hafts for knives, and other tools. The offer of Crassus to Domitius

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of a paler green, placed alternate on the branches, and have short foot-stalks. The flowers come out from the foot-stalks of the leaves, in the same manner as the former, and are succeeded by oval yellow berries, which, when fully ripe, turn of a darker colour. The wood of this tree is very white.

The Celtis, or Lotus Arbor, is of the class and order *Polygamia Monogecia*.

These trees are all propagated by seeds, which should be sown soon after they are ripe, when they can be procured at that season, for they frequently come up the following spring; whereas, those which are sown in the spring, will not come up till a twelvemonth after; therefore it is the best way to sow them in pots or tubs, that they may be easily removed, for those which are sown in the spring should be placed in a shady situation in summer, and constantly kept clean from weeds; but in autumn they should be placed in a warm situation, plunging the pots into the ground; and if they are covered over with a little tan from a decayed hot-bed, it will prevent the frost from penetrating the earth to injure the seeds; and if these pots are placed on a gentle hot-bed in the spring, it will greatly forward the vegetation of the seeds, whereby the plants will have more time to get strength before the winter: but when the plants appear above ground they must have a large share of air admitted to them, otherwise they will be drawn up weak; and as soon as the weather is warm, they must be exposed to the open air, and in summer they must be constantly kept clean from weeds; if the season proves dry, they will require water two or three times a week. In autumn it will be proper to remove the pots, and place them under a hot-bed frame, to shelter them in winter from severe frost; or, where there is not that conveniency, the pots should be plunged into the ground near a wall or hedge; and as the plants, when young, are full of sap, and tender, the early frosts in autumn frequently kill the upper part of the shoots; therefore the plants should be either covered with mats, or a little straw or Pease-haulm laid over them to protect them.

In the following spring the plants should be taken out of the seed-pots, and planted in the full ground: this should be done about the middle or latter end of March, when the danger of the frost is over; therefore a bed or two should be prepared (according to the number of plants raised) in a sheltered situation, and, if possible, in a gentle loamy soil. The ground must be well trenched, and cleared from the roots of bad weeds, and, when levelled, should be marked out in lines at one foot distance; then the plants should be carefully turned out of the pots and separated, so as not to tear their roots, and planted in the lines at six inches asunder, pressing the earth down close to the roots. If the ground be very dry when they are planted, and there is no appearance of rain soon, it will be proper to water the beds, to settle the ground to the roots of the plants; and after this, if the surface of the ground be cover-

BOOK II. for half a dozen of these trees, growing about a house of his in Rome, testifies in what esteem they were had for their incomparable beauty and use.

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ed with some old tan or rotten dung, it will keep it moist, and prevent the drying winds from penetrating to the roots of the plants.

The following summer the necessary care must be to keep them constantly clean from weeds; but after the plants are pretty well established in the ground, they will not require any water, especially toward the latter end of summer, for that will occasion their late growth, whereby they will be in great danger of suffering by the autumn frosts; for the more any of these young trees are stopped in their growth by drought towards autumn, the firmer will be their texture, which will enable them to bear the severity of winter.

The plants may remain in the nursery two years, by which time they will have obtained sufficient strength to be transplanted where they are designed to remain for good; because these plants extend their roots wide every way; so that if they stand long in the nursery, their roots will be cut in removing, which will be a great prejudice to their future growth.

These sorts are hardy enough to thrive in the open air in England, after they are become strong; but for the two first winters after they come up from seeds, they require a little protection, especially the third sort, which is tenderer than either of the former. The young plants of this sort frequently have variegated leaves; but those are more impatient of cold than the plain-leaved.

The wood of the Lotus tree was antiently used for flutes and other musical instruments:

— et horrendo lotos adunca sono. *Ov. Fast.*

Mr. Evelyn judges very properly when he supposes that the fruit of the *Lotus Arbor* could not be the same that was feasted upon by the companions of Ulysses. The enchanting fruit, described by the antients, is produced in Barbary upon a shrub which Linnaeus calls *Rhamnus (Lotus) aculeis geminatis; altero recurvo, foliis ovato-oblongis*. Tournesfort calls it *Zizyphus Sylvestris*. Dr. Shaw, in his Travels into Barbary, had frequent opportunities of examining the shrub in question: He says, "This shrub, which is very common in the *Fereede*, and other parts of Barbary, has the leaves, prickles, flower and fruit of the *Zizyphus*, or *Jubeb*; only with this difference, that the fruit is here round, smaller, and more luscious, and at the same time the branches, like those of the *Paliurus*, are neither so much jointed nor crooked. The fruit is in great repute, tastes something like ginger-bread, and is sold in the markets all over the southern districts of these kingdoms. The Arabs call it *Aneb enta el Seedra*, or the *Jubeb* of the *Seedra*, which *Olavus Celsius* had so high an opinion of, that he has described it as the *Dudaim* of the Sacred Scriptures."

CORNEL*.

CHAP. IV.

The Cornel tree, though not mentioned by Pliny for its timber, is exceedingly commended for its durableness and use in wheel-work, pins, and wedges, in which it lasts like the hardest iron, and it will grow with us to good bulk and stature. The preserved and pickled berries (or Cherries

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The Lotus tree, here described, is mentioned by Homer. It gave name to a race of people described in the ninth Odyssey:

They went, and found an hospitable race:

Not prone to ill, nor strange to foreign guest;

They eat, they drink, and Nature gives the feast;

The trees around them all their food produce,

Lotus the name, divine, nectareous juice!

(Thence call'd *Lotophagi*) which whose tastes,

Infatiate riots in the sweet repasts,

Nor other home, nor other care intends,

But quits his house, his country, and his friends. POPE.

It will be proper to distinguish between this Shrub and an herb often mentioned by the antients, under the name of Lotus. Homer speaks of it as being fed upon by the horses of Achilles; and Virgil mentions it as proper for sheep to increase their milk:

Et cui lactis amor, cythos, lotosque frequentes

Ipse manu, falsasque ferat præsepibus herbas.

GEORG. iii.

* This is the CORNUS (*Mas*) arborea, umbellis involucrum æquantibus, Hort. Cliff. 38. Tree Dogwood with umbels equal to the involucrum. Cornus hortensis mas. C. B. P. 447. Male Cornel, or Cornelian Cherry tree.

As the fruit of this tree is not at present much esteemed, the nursery-men about London propagate it as one of the sorts which is commonly sold as a flowering shrub, and is by some people valued for coming so early to flower; for if the season is mild, the flowers will appear by the beginning of February; and tho' there is no great beauty in the flowers, yet, as they are generally produced in plenty, at a season when few other flowers appear upon trees, a few plants of them may be admitted for variety. The fruit of this tree is seldom ripe before September. The tree will grow to the height of eighteen or twenty feet, forming a large head.

This tree is of the class and order *Tetrandria Monogynia*.

The Cornelian Cherry tree should be raised from seeds. These should be sown in the autumn, soon after they are ripe, or they will not come up till the second spring; and sometimes, when the intermediate summer has proved very dry, they will not appear.

Book II. rather) are most refreshing, an excellent condiment, and do also well in tarts. But it is very odd what Mathiolus affirms upon his own experience, that one who has been bitten of a mad dog, if in a year after he handle the wood of this tree till it grows warm, relapses again into his former distemper.

The same is reported of the *Cornus Fæmina*, or Wild Cornel, which is like the former for compactness, and made use of for cart-timber, and other rustick instruments; it also makes the best of butchers' scewers and tooth-pickers. In some countries abroad they decoct the berries, which, pressed, yield an oil for the lamp.

A C A C I A *

The *Acacia*, together with that from Virginia, deserves a place among our avenue trees, (could they be made to grow upright) adorning our walks with their exotic leaf and sweet flowers, very hardy against the pinching winter, but not so proof against its blustering winds, though it be armed

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till the summer after; so that great care should be used to get these seeds into their beds as soon as possible; or if the work cannot be done before the spring, and the plants do not come up, the bed should be left undisturbed for at least the two seasons following.

When the plants have made their appearance, they may stand in the seed-beds a year or two to acquire strength; during which time they should be kept clean of weeds, and in dry weather watered. After this, they should be planted out in the nursery, in rows, where they may remain, with the usual care, till they are fit to be planted out for good; the best season for which is the autumn.

The Cornelian Cherry tree is a native of Misnia, Austria, and some other places, but grows very well with us; and may be planted with success on most soils.

* The Triple-thorned *ACACIA* is titled, *Gleditsia spinis triplicibus axillaribus*. In the Upsal Catalogue it is termed simply, *Gleditsia*; in the *Hortus Cliffortianus*, *Cæsalpinoides foliis pinnatis ac duplicato-pinnatis*. Micheli calls it *Melilobus*; Duhamel, *Gleditsia spinosa*; Plukenet, *Acacia Americana*, *Abrusæ folio*, *triacanthos*; and Cateby, *Acacia*, *Abrusæ folio*, *triacanthos*, *capsula ovali unicum semen claudente*.

Gleditsia is of the class and order *Polygamia Dioecia*.

The growth of the *Acacia* is naturally upright, and its trunk is guarded by thorns of three or four inches in length. These thorns have also others coming out of their

with thorns; nor do the roots take such hold of the ground, insinuating, and running more like liquorice, and apt to emaciate the soil: I will not therefore commend it for gardens, unless for the variety, of which there are several, some without thorns. They love to be planted in moist ground.

One thing more there is, which (for the use and benefit which these and the like exotics afford us) I would take hold of, as upon all occasions I do in this work; namely, to encourage all imaginable industry of such as travel foreign countries, and especially Gentlemen who have concerns in our American plantations, to promote the culture of such plants and trees, especially timber, as may yet add to those we find already agreeable to our climate in England. What we have said of the Mulberry, and the vast emolument raised by the very leaves, as well as wood of that only tree, (besides those we now have mentioned, strangers till of late, and believed *incicurable* here) were sufficient to excite and stir up our utmost industry. History tells us, the noble and fruitful country of France was heretofore

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sides at nearly right angles: Their colour is red. The branches are smooth, and of a white colour. These are likewise armed with red thorns, that are proportionally smaller: They are of several directions, and at the ends of the branches often stand single. The young shoots of the preceding summer are perfectly smooth, of a reddish green, and retain their leaves often until the middle of November. Although there is a peculiar oddity in the nature and position of the spines, yet the leaves constitute the greatest beauty of these trees: They are doubly pinnated, and of a delightful shining green. The pinnated leaves that form the duplication, do not always stand opposite by pairs on the middle rib; the pinnæ of which they are composed are small and numerous; no less than ten or eleven pair belong to each of them; and as no less than four or five pair of small leaves are arranged along the middle rib, the whole compound leaf consists often of more than two hundred pinnæ of this fine green colour: They sit close, and spread open in fine weather; though at the approach of bad weather they will droop, and their upper surfaces nearly join, as if in a sleeping state. The flowers are produced from the sides of the young branches in July: They are a greenish catkin, and make little show; many are succeeded by pods, that have a wonderful effect; for these are exceeding large, more than a foot, and sometimes a foot and a half in length, and two inches in breadth, and of a nut-brown colour when ripe.

There is a variety of this species, with fewer thorns, smaller leaves, and oval pods. It has nearly the resemblance of the other; though the thorns being not so frequent, and the pods smaller, each containing only one seed, this sort loses that singular effect which the other produces by them.

The culture of these beautiful and noble trees is not very difficult. We receive the seeds from America in the spring, which keep well in the pods, and are for the most

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thought so sterile and barren, that, nothing almost prospering in it, the inhabitants were quite deserting it, and with their wives and children going to seek some other more propitious abode; when some of them happening to come into Italy, and tasting the juice of the delicious grape, the rest of their countrymen took arms, and invaded the territories where those vines grew, which they transplanted into Gallia, and have so infinitely improved since, that France alone yields more of that generous liquor than not only Italy and Greece, but all Europe and Asia beside: Who almost would believe that the austere Rhenish, abounding on the fertile banks of the Rhine, should produce so soft and charming a liquor, as does the same vine, planted among the rocks and pumices of the so remote and mountainous Canaries?

This for the encouragement and honour of those who improve their countries with things of use and general benefit: Now, in the mean time, how have I beheld a florist, or meaner gardener, transported at the casual discovery of a new little spot, double-leaf, streak or dash extraordinary in

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part good. They generally arrive in February; and, as soon as possible after, they should be sown in a well-sheltered warm border of light sandy earth. If no border is to be found that is naturally so, it may be improved by applying drift sand, and making it fine. The seeds should be sown about half an inch deep; and they will, for the most part, come up the first spring. If the summer should prove dry, they must be constantly watered; and if shade could be afforded them in the heat of the day, they would make stronger plants by the autumn. A careful attention to this article is peculiarly requisite; for as the ends of the branches are often killed, if the young plant has not made some progress, it will be liable to be wholly destroyed by the winter's frost, without protection; and this renders the sowing the seeds in a warm border, under an hedge, in a well-sheltered place, so necessary; for there these shrubs will endure our winters, even when seedlings, and so will require no farther trouble; nay, though the tops should be nipped, they will shoot out again lower, and soon recover themselves.

It will be proper to let them remain two years in the seed-bed, before they are planted out in the nursery. The spring is the best time for the work. Their distance should be one foot by two. The earth between the rows should be dug every winter; and, being weeded in summer, the plants may remain, with no other particular care, until they are set out for good. These trees are late in the spring before they exhibit their leaves, but keep shooting late in the autumn. They should not only join in wilderness-quarters, with others of their own growth, but some of them should be planted singly in opens, &c. where they will excite admiration, by their triple spines, fine leaves, and large pods.

a Tulip, Anemonie, Carnation, Auricula or Amaranth! cherishing and calling it by their own names, raising the price of a single bulb to an enormous sum, till a law was made in Holland to check that *Tulipomania*; the florist, in the mean time, priding himself as if he had found the Grand Elixir, or performed some notable atchievement, and discovered a new country.

This for the defects (for such those variegations produced by practice, or mixture, mangonisms and starving the root, are by chance met with now and then) of a fading flower: How much more honour then were due in justice to those persons, who bring in things of much real benefit to their country? especially trees for fruit and timber; the Oak alone (besides the shelter it afforded to our late Sovereign Charles II.) having so often saved and protected the whole nation from invasion, and brought it in so much wealth from foreign countries. I have been told there was an intention to have instituted an Order of the Royal Oak; and truly I should think it to become a Green Ribbon, next to that of St. George, superior to any of the romantic badges, to which is paid such veneration abroad, deservedly to be worn by such as have signalized themselves by their conduct and courage, for the defence and preservation of their country. Bespeaking my reader's pardon for this digression, we proceed in the next to other useful Exotics.

C H A P. V.

The CORK, ILEX, ALATERNUS, CELASTRUS,
LIGUSTRUM, PHILLYREA, MYRTLE, LENTIS-
CUS, OLIVE, GRANATUM, SYRINGA,
and JASMINE.*

BOOK II.

WE do not exclude this useful tree from those of the glandiferous and forest; but being inclined to gratify the curious, I have been induced to say something farther of such *semper virentia*, as may be made to sort with those of our own.

SUBER. The Cork tree. Of this there are two sorts, one of a narrow, or less jagged leaf, and perennial; the other of a broader, and falling in winter. It grows in the coldest parts in Biscay, in the north of New-England, in the south-west of France, especially the second species, fittest for our climate; and in all sorts of ground, dry heaths, stony and rocky mountains, so as the roots will run even above the earth, where they have little to cover them; all which considered, methinks we should not despair.

N O T E S.

* *QUERCUS (Suber)* foliis ovato-oblongis indivisis serratis subtus tomentosis, cortice rimoso fungoso. Hort. Cliff. 448. *Oak, with oval, oblong, undivided leaves, which are sawed and woolly on their under-side, and with a fungous cleft bark. Suber latifolium sempervirens. C. B. P. 424. The Broad-leaved Evergreen Cork tree.*

It is of the class and order *Monoecia Polyandria*.

This is a timber-tree in Portugal and Spain, and other southern parts of Europe, where it grows naturally. In the plantations made here, it should be placed near the middle of the largest quarters, among others of about forty feet growth; and a few also should be planted singly in opens, that the fungous bark may be in view; not that there is any great beauty merely in the sight, but with us it is a curiosity, being the true Cork, and of the same nature with what comes from abroad. The bark on the trunk and main branches is rough and spongy; but on the young shoots it is smooth and gray, and on the youngest, white and downy. The leaves are of an oblong oval figure with sawed edges. Their upper surface is smooth and of a strong green colour, but their under is downy. They grow alternately on the branches, on very short though strong foot-stalks, and indeed differ in appearance very little from many



The Cork Tree

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J. Miller del. & Sculpt.

We have said where they grow plentifully in France; but by Pliny, (Nat. Hist. l. xvi. c. viii.) it should seem they were since transplanted thither; for he affirms there were none either there or in Italy in his time: But I exceedingly wonder that Carolus Stephanus and Cursius should write so peremptorily that there were none in Italy; where I myself have travelled through vast woods of them about Pisa, Aquin, and in divers tracts between Rome and the kingdom of Naples, and in France. The Spanish Cork is a species of *Enzina*, differing chiefly in the leaf, which is not so prickly, and in the bark, which is frequently four or five inches thick. The manner of decortication thereof, is once in two or three years to strip it in a dry season, otherwise the intercutaneous moisture endangers the tree, and therefore a rainy season is very pernicious; when the bark is off, they unwarp it before the fire, and press it even, and that with weights upon the convex part, and so it continues, being cold.

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sorts of the *Ilex*. The flowers of this species of Oak make no shew—and the acorns, when ripe, are long, smooth, and of a brown colour.

There is a variety of this tree called the Narrow-leaved Cork tree. Its leaves are smaller, which qualifies it for a place in our plantations where variety is required.

The best Cork is taken from the oldest trees, the bark on the young trees being too porous for use. They are, nevertheless, barked before they are twenty years old; and this operation is necessary, to make way for a better bark to succeed, it being observable that, after every stripping, the succeeding bark encreases in value. They are generally peeled once in ten years, with an instrument for that purpose; and this is so far from injuring the trees, that it is necessary, and contributes to their being healthy; for without it they thrive but slowly; nay, in a few years they will begin to decay, and in less than a century a whole plantation will die of age; whereas those trees that have been regularly peeled, will last upwards of two hundred years.

The bark of this tree was formerly used for making bee-hives; and Varro says, that those which are made of this material are the best: “*Optimæ fiunt corticæ, deterrimæ fistiles, quod et frigore hyeme, et æstate calore vehementissime hic commoventur.*” Virgil speaking of providing commodious habitations for his bees, says,

Ipse autem, seu corticibus tibi futa cavatis,

Seu lento fuerint alvearia vimine texta,

Angustos habeant aditus.

GEORG. IV.

The bark of the Cork tree was by the antients called *Cortex*, by way of eminence: “*Tu cortice levior.*” And Pliny says, the Greeks not inelegantly called this tree the Bark tree: “*Non isfacete Græci corticis arborem appellant.*”

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The uses of Cork is well known amongst us, both at sea and land, for its resisting both water and air; the fishermen who deal in nets, and all who deal with liquors, cannot be without it: antient persons prefer it before leather for the soles of their shoes, being light, dry, and resisting moisture; whence the Germans name it Pantoffel-holts, (Slipper-wood) perhaps from the Greek *παῖος & φέλλος*; for I find it first applied to that purpose by the Grecian Ladies, whence they were called light-footed: I know not whether the epithet do still belong to that sex; but from them it is likely the Venetian Dames took it up for their monstrous choppines; affecting or usurping an artificial eminency above men, which nature has denied them. Of one of the sorts of Cork are made pretty cups, and other vessels, esteemed good to drink out of for hysterical persons. The Egyptians made their coffins of it, which being lined with a resinous composition, preserved their dead incorrupt. The poor people in Spain lay broad planks of it by their bed-side to tread on, (as great persons use Turkey and Persian carpets) to defend them from the floor, and sometimes they line or wainscot the walls and inside of their houses built of stone, with this bark, which renders them very warm, and corrects the moisture of the air; also they employ it for bee-hives, and to double the insides of their contemplors and leather-cases, wherein they put flasqueras with snow to refrigerate their wine. This tree has beneath the Cortex, or Cork, two other coats, or libri, of which one is reddish, which they strip from the bole when it is felled only, and this bears a good price with the tanner; the rest of the wood is very good firing, and applicable to many other uses of buildings, palisade-work, &c. The ashes drunk, stop the bloody-flux.

I L E X *.

Ilex major glandifera, or great Scarlet Oak, of several species, and various in the shape of their leaf, pointed, rounder, longer, &c. (a devoted tree of old, and therefore *incædua*) thrives manifestly with us; wit-

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* *QUERCUS (Ilex) foliis ovato-oblongis indivisis ferratisque petiolatis subtus incanis, cortice integro. Ilex folio angusto non ferrato.* C. B. P. 424: *The narrow-leaved Evergreen Oak.*

The *Ilex* is of the class and order *Monœcia Polyandria*.

This is a well-known Evergreen, of which there are several varieties differing greatly in the size and shape of their leaves; but these will all arise from acorns of the

ness his Majesty's Privy-Garden at Whitehall, where once flourished a goodly tree, of more than fourscore years growth, and there was lately a sickly imp of it remaining: And now very many raised by me have thriven wonderfully, braving the most severe winters, planted either in standards or hedges, which they most beautifully become. The only difficulty is in their being dextrously removed out of the nursery, with the mould adhering to the roots, otherwise they are apt to miscarry; and therefore it is best trusting to the acorn for a goodly standard, which may be removed without prejudice. Trials should be made by grafting the Ilex on the Oak-stock, taken out of our woods, or better, grown from the acorn to the bigness of one's little finger.

By what I have touched in the chapter of the Elms, concerning the peregrination of that tree into Spain, (where even in Pliny's time there were none, and where now they are in great abundance) why should we not more generally endeavour to propagate the Ilex amongst us; I mean that which the Spaniards call the Enzina, and of which they have such woods and profitable plantations? They are an hardy sort of tree, and familiarly raised from the acorn, if we could have them found, and well put up in earth or sand, as I have found by experience.

The wood of these Ilexes is serviceable for many uses, as stocks of tools, mallet-heads, mall-balls, chairs, axle-trees, wedges, beetles, pins, and above all, for palisadoes used in fortifications: Besides, it affords so good fuel, that it supplies all Spain almost with the best and most lasting of charcoals in vast abundance. Of the first kind is made the painter's lac,

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same tree; nay, the lower and upper branches of the same tree are frequently garnished with leaves very different in size and shape from each other; those on the lower branches being much broader, rounder, and their edges indented and set with prickles, but those of the upper are long, narrow, and entire. The leaves of the Ilex are from three to four inches long, and one broad near the base, gradually lessening to a point; they are of a lucid green on their upper side, but whitish and downy on their under, and are entire, standing upon pretty long foot-stalks; these remain green all the year, and do not fall till they are thrust off by young leaves in the spring. The acorns are smaller than those of the common Oak, but of the same shape.

The Ilex major glandifera, mentioned by Mr. Evelyn, is the *Smilax Arcadium glandifera* major. Park. Theatr. 1396. *Smilax Delachampii*. *The Great Scarlet Oak*.

BOOK II. extracted from the berries; to speak nothing of that noble confection al-
 kermes, and that noble scarlet dye the learned Mr. Ray gives us the pro-
 cess of at large, in his chapter of the Ilexes. To this add that most ac-
 curate description of this tree and the Vermicula (see Quinquernus, l. ii.
 de Laud. Provid. fol. 48) naturally abounding about Alos. The acorns
 of the Coccigera, or Dwarf Oak, yield excellent nourishment for rustics,
 sweet, and little, if at all, inferior to the Chesnut: and this, and not the
 Fagus, was doubtless the true Esculus of the antients, the food of the
 Golden Age. The wood of the Enzina, when old, is curiously cham-
 bletted and embroidered with natural vermiculations, as if it were painted.
 Note, That the Kermes tree does not always produce the Coccum, but
 near the sea, and where it is very hot; nor indeed when once it comes to
 bear acorns; and therefore the people do often burn down the old trees,
 that they may put forth fresh branches, upon which they find them. This
 (as well as the Oak, Cork, Beech, and Corylus) is numbered amongst the
 felices and lucky trees, but for what reason the Alaternus, which I shall
 next speak of, together with the Agrifolium (Holly), Pines, Salix, &c.
 should be excommunicated, as infelices, I know not, unless for their be-
 ing dedicated to the infernal deities; of which Macrobius Sat. lib. ii. c. xvi.
 In the mean time take this for a general rule, that those were called infe-
 lices only, which bare no fruit; for so Livy, lib. v. *Nulla felix arbor, nihil
 frugiferum in agro relictum*. Whence that of Phædrus, lib. iii. Fab. upon
 Jupiter's Esculus,

O nata, merito sapiens dicere omnibus:

Nisi utile est quod facimus, stulta est gloria.

Reciting the antient trees sacred to the Deity, the most desirable being
 those that were fruitful, and for use.

A L A T E R N U S.

This tree, which we have lately received from the hottest parts of
 Languedoc, (and that is equal with the heat of almost any country in
 Europe) thrives with us in England, as if it were an indigene and natural;
 yet sometimes yielding to a severe winter, followed with a tedious eastern
 wind in the spring, of all the enemies of our climate the most hostile and
 cruel; and therefore to be artificially and timely provided against with
 shelter.

I have had the honour to be the first who brought it into use and repu-
 tation in this kingdom, for the most beautiful and useful of hedges and

verdure in the world, the swiftness of the growth considered, and propagated it from Cornwall even to Cumberland: The seed grows ripe with us in August, and the honey-breathing blossoms afford an early and marvelous relief to the bees.

CHAP. V.

CELASTRUS and LIGUSTRUM.

Of these shrubs I shall say no more than that they are flexible and accommodate for topiary works.

PHILLYREA*.

The Phillyrea (of which there are five or six sorts, and some variegated) is sufficiently hardy, especially the Seratifolia, which makes me wonder to find the Angustifolia planted in cases, and so charily set into the stoves, amongst the Oranges and Lemons; when, by long experience, I have found it equalling our Holly, in suffering the extremest rigours of our cruel frosts and winds, which, doubtless, of all our English trees, is the most insensible and stout.

They are (both Alaternus and this) raised of the seeds, (though those of the Phillyrea will be long under ground) and being transplanted for espalier hedges or standards, are to be governed by the sheers, as oft as there is occasion: The Alaternus will be up in a month or two after it is sown. I was wont to wash them out of the berry, and drying them in a little cloth, commit them to the nursery-bed. Plant it out at two years growth, and clip it after rain in the spring, before it grows sticky, and whilst the shoots are tender; thus will it form an hedge (though planted but in single rows, and at two feet distance) of a yard in thickness, twenty feet high, if you desire it, and furnished to the bottom: But for an hedge of this altitude, it would require the friendship of some wall, or a frame of lusty poles, to secure against the winds one of the most delicious ob-

NOTES.

* Of the Phillyrea there are only three real species: 1. Oval-leaved Phillyrea.— 2. Broad-leaved Phillyrea.— 3. Narrow-leaved Phillyrea.— The Oval-leaved sort has the following varieties: 1. Common Smooth-leaved Phillyrea.— 2. Privet-leaved Phillyrea.— 3. Olive-leaved Phillyrea. By some gardeners the Alaternus is mistaken for the Phillyrea; but they are very different plants, the Phillyrea having two stamina only, and the Alaternus five. Besides, the leaves of the Phillyrea stand opposite on the branches by pairs, but those of the Alaternus stand single, and are produced in an alternate manner.

Book II. jects in nature: But if we could have store of the Phillyrea folio leviter serrato, (of which I have raised some very fine plants from the seeds) we might fear no weather, and the verdure is incomparable, and all of them tonfile, fit for cradle-work and Umbracula frondium.

M Y R T L E *

The vulgar Italian wild Myrtle (though not indeed the most fragrant) grows high, and supports all weathers and climates. They thrive abroad in Brittany, in places cold and very sharp in winter; and are observed nowhere to prosper so well as by the sea-coasts, the air of which is more propitious to them, as well as to oranges and lemons, than the inland air. I know of one near eighty years old, which has been continually exposed, unless it be, that in some exceeding sharp seasons, a little dry straw has been thrown upon it; and where they are smitten, being cut down near the ground, they put forth and recover again; which many times they do not in pots and cases, where the roots are very obnoxious to perish with mouldiness. The shelter of a few mats and straw secured very great trees, both leaf and colour in perfection, this last winter also, which were planted abroad, whilst those that were carried into the Conserve were most of them lost. Myrtles, which are of six or eight sorts, may be raised of seeds; but with great caution, and after all, seldom prove worth the pains, being so abundantly multiplied of suckers, slips, and layers. The double-flower, which is the most beautiful, was first discovered by the incomparable Fabr. Piereshy, which a mule had cropt from a wild shrub. Note, That

N O T E S.

* Of this most delicately looking shrub there are thirteen species described by Linnaeus. The common kind is called *Myrtus floribus solitariis: involuero diphylo. Sp. Pl. 673.* It is of the class and order *Icosandria Monogynia.*

The common broad-leaved Myrtle is the hardiest of all the kinds. The leaves are an inch and half long and one inch broad, of a lucid green, and standing upon short foot-stalks. The flowers are larger than the other sorts, and come out from the sides of the branches, on pretty long foot-stalks: These are succeeded by oval berries of a dark purple colour, inclosing three or four hard kidney-shaped seeds. It flowers in July and August, and the berries ripen in winter. This is by some called the Flowering Myrtle.

Amongst the antients every tree had its Protector. The Myrtle was favoured by Venus; but whether from the delicacy and elegance of its form, or its love to the sea-shore, “*amantes littora Myrtos,*” or any other cause, I shall not here attempt to decide.

you cannot give those plants too much compost or refreshing, nor clip them too often, even to the stem, which will grow tall, and prosper into any shape; so as arbours have been made of single trees of the hardy kind, protected in the winter with sheds of straw and reeds. Both leaves and berries refrigerate, and are very astringent and drying, and therefore seldom used within, except in fluxes: The berries mitigate inflammations of the eyes, and consolidate broken bones: a decoction of the juice, leaves, and berries dyes the hair black, & *enecat Vitiligines*, as Dioscorides says, lib. i. cap. cxxviii. There is an excellent sweet water extracted from the distilled leaves and flowers.

The varieties of this rare shrub, now furnishing the gardens and porticoes as long as the season and weather suits, and even, in the severest winters, the conclaves, are cut and contrived into various figures, and of divers variegations most likely to be produced by the seeds, as our learned Mr. Ray believes, rather than by layers, suckers, or slips, or from any difference of species. In the mean time, let gardeners make such trials, whilst those most worth the culture are the Small and Broad-leaved, the Tarentine, the Belgick, Latifolia, and Double-flowered, and several more among the curious. The Myrtle, of old, was sacred to Venus, and so called from a virgin beloved of Minerva. Garlands of the leaves and blossoms impaled the brows of *incruentous* victors at ovations. *

CANDLEBERRY.

And now if here, for the name only, I mention the *Myrtus Brasitica*, or Candleberry shrub, (which our plantations in Virginia and other places have in plenty) let it be admitted: It bears a berry which, being boiled in water, yields a soft or pinguid substance, of a green colour; after being scummed and taken off, they make candles with this, in the shape of such as we use of tallow, or wax rather; giving not only a very clear and sufficient light, but a very agreeable scent: those are now frequently brought hither to us, as also the tree itself, of which I have seen a thriving one.

NOTES.

* A Myrtle crown was worn by the General to whom an OVATION was decreed, but at a TRIUMPH the Victor always wore a Laurel one. The reason of this is given by Plutarch in the Life of Marcellus, viz. That as an OVATION was decreed for some remarkable success obtained by treaty, or without much bloodshed, it was proper that the General at his public appearance should be crowned with the tree sacred to Venus, who, of all the Deities, was supposed to be the most averse to the horrors of war.

L E N T I S C U S.

Book II.

This is a very beautiful Evergreen, and refuses not our climate when protected with a little shelter: it is propagated by suckers and layers. Of this tree are made the best tooth-pickers in the world, and the mastic, or gum, produced from it, is of excellent use in fastening the gums.

O L I V E.

As the Lentisc, so may the Olive be admitted, though it produce no other fruit than the verdure of the leaf; nor will it kindly breathe our air; nor the less tender Oleaster*, without the indulgent winter-house take them in.

G R A N A T U M †. *MALUS PUNICA.*

This is nothing so nice. There are of this glorious shrub three sorts, easily enough educated under any warm shelter, even to the raising hedges.

N O T E S.

* The title of the Oleaster, or Wild Olive, is, *Elæagnus foliis lanceolatis*. In the *Hortus Cliffortianus* it is termed simply, *Eleagnus*. Caspar Bauhine calls it, *Olea sylvestris*, *folio molli incano*. It grows naturally in Bohemia, Spain, Syria, and Cappadocia.

It is of the class and order *Tetrandria Monogynia*.

This tree will grow to near twenty feet in height. The branches are smooth, and of a brown colour. The preceding year's shoots are white and downy, and the silvery leaves are placed irregularly on them: These are of a spear-shaped figure, about two, and sometimes three inches long, and three quarters of an inch broad, and are as soft as fatten to the touch. Neither in summer the only time the leaves afford us pleasure: They continue on the tree great part of the winter. The flowers appear in July, but make no figure: They are small, and come out at the foot-stalks of the leaves; their colour is white, and they are possessed of a strong scent. The fruit that succeeds them much resembles a small Olive. Of this shrub there is a variety with yellow flowers.

† Of this Genus there are two Species.

1. *PUNICA (Granatum) foliis lanceolatis, caule arboreo*. Hort. Cliff. 134. *Pomegranate with linear spear-shaped leaves, and a tree-like stalk*. *Malus Punica Sativa*. B. P. 438. *The Pomegranate*.

This tree is now pretty common in the English gardens, where formerly it was nursed up in cases, and preserved in green-houses with great care (as was also the

of them, nor indeed affects it so much heat, as plentiful watering. They supported a very severe winter in my garden, 1663, without any trouble or artifice; and if they present us their blushing double flowers for the pains of recision and well pruning, (for they must diligently be purged of superfluous wood) it is recompence enough; though placed in a very benign aspect, they have sometimes produced a pretty small pome. It is a *Perdifolia* in winter, and growing abroad, requires no extraordinary rich earth, but that the mould be loosened and eased about the root, and hearty compost applied in spring and autumn: Thus cultivated, it will rise to a pretty tree, though of which there is in nature none so adulterate a shrub. It is best increased by layers, approach and inarching, as they term it, and is said to marry with Laurels, the Damson, Ash, Almond, Mulberry, Citron, too many I fear to hold. But, after all, they do best being eased, the mould well mixt with rotten hogs dung, its peculiar delight, and kept to a single stem, and treated like other plants in the winter shelter; they open the bud and flower, and sometimes with a pretty small fruit; the

NOTES.

double flowering kind); but they are both hardy enough to resist the severest cold of our climate in the open air; and, if planted against warm walls in a good situation, the first sort will often produce fruit, which in warm seasons will ripen tolerably well; but as these fruits do not ripen till late in the autumn, they are seldom well tasted in England, for which reason the sort with double flowers is commonly preferred. Of this species there are the following varieties: 1. The Wild Pomegranate with single and double flowers.—2. The Sweet Pomegranate. 3. The Small Flowering Pomegranate with single and double flowers.—4. The Pomegranate with striped flowers.

The double flowering kind is most esteemed in this country for the sake of its large, fine, double flowers, which are of a most beautiful scarlet colour; and, if the trees are supplied with nourishment, will continue to produce flowers for two months successively, which renders it one of the most valuable flowering trees yet known

2. *PUNICA (Nana)* foliis linearibus, caule fruticoso. *Pomegranate with linear leaves, and a shrubby stalk.* *Punica Americana nana* seu humillima. Tourn. Inf. 636. *The American Dwarf Pomegranate.*

This sort grows naturally in the West-Indies, where the inhabitants plant it in their gardens to form hedges. It seldom rises more than five or six feet high in those countries, so may be kept within compass, and there the plants continue flowering great part of the year. The flowers of this kind are much smaller than those of the common sort; the leaves are shorter and narrower, and the fruit is not larger than a nutmeg, and has little flavour, so it is chiefly propagated for the beauty of its flowers.

BOOK II. juice whereof is cooling, and the rest of an astringent quality. The rind may also supply the gall for making ink, and will tan leather.

SYRINGA *. LILAC.

This is easily propagated by suckers or layers; the flower of the white, (emulating both the colour and flavour of the Orange) I am told, is made use of by the perfumers, I should not else have named it among the Evergreens; for it loses the leaf, though not its life, however exposed in the winter: There are besides this the Purple, by our botanists called the Persian Jussamine, which leads me to the other Jasmynes.

JASMINE.

This, especially the Spanish larger flower, far exceeds all the other sweet-smelling shrubs for the agreeable odour and use of the perfumer: The common White and Yellow will flower plentifully in our groves, and climb about the trees, being as hardy as any of our Periclimena and Honey-suckles.

How it is increased by submersion and layers, every gardener skills; and were it as much employed for nosegays, &c. with us, as it is in Italy and France, they might make money enough of the flowers; one sorry tree in Paris, where they abound, has been worth to a poor woman near a pistole a year.

There is no small curiosity and address in obtaining the oil, or essence, as we call it, of this delicate and evanid flower, which I leave to the Chemist and the Ladies, who are worthy the secret.

NOTES.

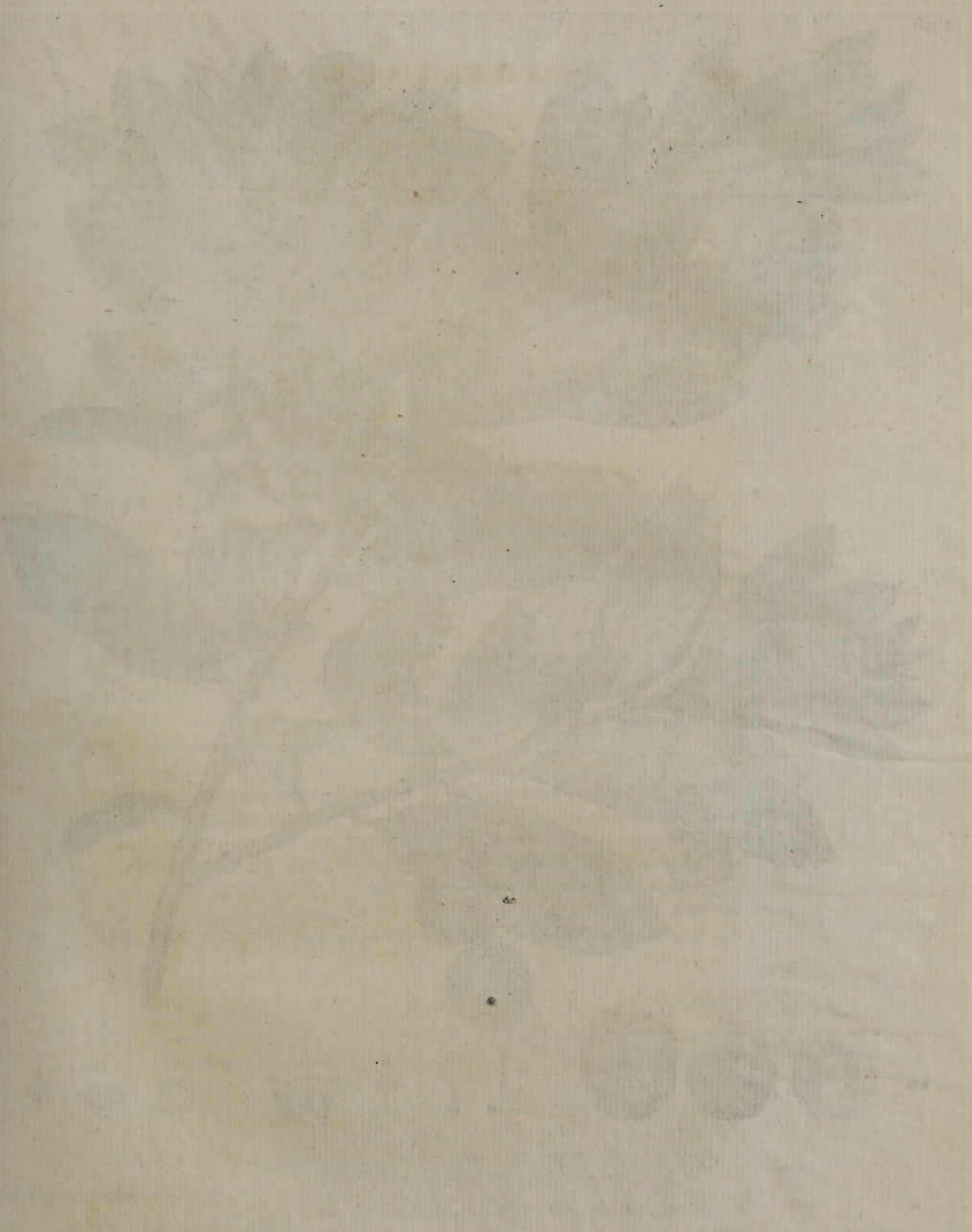
* Though the varieties of this tree are numerous, the real distinct species are only two.

1. SYRINGA (*Vulgaris*) foliis ovato-cordatis. Hort. Cliff. 6. *Syringa with oval heart-shaped leaves.* Syringa cærulea. B. P. 398. *Blue Syringa. The Blue Lilac.*

2. SYRINGA (*Persica*) foliis lanceolatis. Lin. Sp. Pl. 11. *Syringa with spear-shaped leaves.* Lilac folio Ligustri Tourn. Inst. 602. *Lilac with a Privet leaf, commonly called Persian Jasmine.*

Syringa is of the class and order *Diandria Monogynia*.

Both these kinds, together with their varieties, are best propagated by layers. The first sort may be raised from the seeds, which ripen in autumn.





The Strawberry Tree.

Published Jan'y 1776 by A. Hunter Sc. D. as the Act directs.

J. Miller del et Sculp.

CHAP. VI.

The ARBUTUS*, BOX, YEW, HOLLY, LAUREL,
and BAY.

ARBUTUS. The Strawberry-tree. This is, I think, too much neglected by us, making that a rarity which grows so common and naturally in Ireland: It is indeed with some difficulty raised by seeds, but easily propagated by layers; if skilfully pruned, it grows to a goodly tree, CHAP. VI.

N O T E S.

* Of this genus there are five species.

1. ARBUTUS (*Unedo*) foliis glabris ferratis, baccis polyspermis, caule erecto arboreo. *Strawberry-tree with smooth sawed leaves, berries having many seeds, and an upright trunk.* Arbutus folio-ferrato. C. B. P. 460. Arbutus. Cam. Epit. 168.

This sort grows naturally in Italy, Spain, and also in Ireland, and is now very common in the English gardens. It produces the following varieties, viz. one with an oblong flower and oval fruit; another with a double flower; and a third with red flowers.

2. ARBUTUS (*Andrachne*) foliis glabris integerrimis, baccis polyspermis, caule erecto arboreo. Lin. Sp. Pl. 566. *Strawberry tree with smooth entire leaves, berries full of seeds, and an erect woody stem.* Arbutus folio non ferrato. C. B. P. 46. Andrachne Theophrasti. Clus. Hist. 48. Called *Andrachne*.

This kind grows naturally in the east, particularly about Magnesia, where it is so plenty, as to be the principal fuel used by the inhabitants of the country. This grows to a middle-sized tree; the branches are irregular, and are garnished with large oval leaves, somewhat like those of the Bay tree, but not quite so long; these are smooth and entire, having no serratures on their edges; the flowers are shaped like those of the common Arbutus, but grow thinly on the branches. The fruit is oval, and of the same colour and consistence with the common sort, but the seeds of this are flat, whereas those of the common sort are pointed and angular.

3. ARBUTUS (*Acadiensis*) caulibus procumbentibus, foliis ovatis subferratis floribus sparsis, baccis polyspermis. Lin. Sp. Pl. 566. *Arbutus with trailing stalks, oval leaves, somewhat indented, flowers growing loosely, and many seeds.* Vitis idæa Acadiensis, foliis Alaterni. Tourn. Inst.

This sort grows naturally in Acadia, and other northern parts of America, upon swampy land, which is frequently overflowed with water; this is a low bushy shrub, with slender trailing branches, which are garnished with oval leaves, &

Book II. patient of our clime, unless the weather be very severe; it may be contrived into most beautiful palisades, and is ever verdant: I am told the tree grows to a huge bulk and height on mount Athos and in other countries.

N O T E S.

little sawed on their edges; the flowers come out from the wings of the leaves, growing in thin loose bunches. The fruit of this sort is never produced in England, and it is with great difficulty the plants are kept alive here.

4. *ARBUTUS (Alpina)* caulibus procumbentibus, foliis rugosis ferratis. Flor. Lap.
 161. *Arbutus with trailing stalks and rough sawed leaves.* Vitis idæa foliis oblongis albicantibus. C. B. P. 470. Vitis idæa. Clus. Hist.

This grows naturally on the Alps and the Helvetian mountains. It never rises high, but sends out from the root many slender branches, which trail upon the ground, garnished with oblong rough leaves, of a pale green colour; the flowers are produced from the wings of the leaves, upon long slender foot-stalks, and are succeeded by berries about the size of the common black Cherry, which are first green, afterwards red, and when ripe are black. These are of a pleasant taste, so are frequently eaten by the inhabitants of those countries where they grow naturally. This is a very difficult plant to keep alive in gardens, for it is an inhabitant of bogs, growing among moss, where the ground is never dry.

5. *ARBUTUS (Uva Ursi)* caulibus procumbentibus, foliis integerrimis. Flor. Lap.
 162. *Arbutus with trailing stalks and entire leaves.* Uva Ursi. Clus. Hist.

This grows naturally upon the mountains in Spain, and in most of the northern parts of Europe. The branches trail on the ground, which are closely garnished with smooth thick leaves of an oval form, placed alternately; the flowers are produced in small bunches toward the extremity of the branches, which are shaped like those of the common sort, but smaller; and are succeeded by berries, of the same size with those of the former sort, which are red when ripe.

Arbutus is of the class and order *Decandria Monogynia*.

The common Strawberry tree is well known, being at present in most of the English gardens, and one of their greatest ornaments in the months of October and November, that being the season when the trees are in flower, and the fruit of the former year is ripe, for the fruit is a whole year growing to perfection; so that the fruit which is produced from the flowers of one year, do not ripen till the blossoms of the succeeding year are fully blown; when there is plenty of fruit and flowers upon the trees they make a fine appearance, and at a season when most other trees are past their beauty.

————— pomoque onerata rubenti

Arbutus.

OID.

Those trees which have large oval fruit, make the greatest figure, their flowers being larger, and oblong. The sort with double flowers is a curiosity; but as the

Virgil reports its inoculation with the nut. Bauhinus commends the coal CHAP. VI.
for the goldsmiths' works; and the Poet.

Arbutæ crates, & mystica Vannus Iacchi. GEORG. i.

Arbutean harrows, and the mystick van.

N O T E S.

Flowers have only two orders of leaves, so they make no great appearance; nor do the trees produce fruit in any plenty, therefore the other is preferable. The sort with red flowers makes a pretty variety, when intermixed with the other; for the outsides of them are of a fine red colour at their first appearance, and afterward they change to purple before they fall off. The fruit of this is the same with the common sort. All these varieties are preserved by inarching or grafting them upon the common Arbutus, for the seeds of either do not produce the same kind; though from the seeds of the oval fruit, there are generally many more of the same produced, than from the seeds of the common sort.

The best method to propagate the Arbutus is from seeds; therefore when the fruit is perfectly ripe, it should be gathered and mixed with dry sand, to preserve it till the time for sowing; the surest method of raising the plants, is to sow the seeds in pots, which should be plunged into an old bed of tanners' bark, which has lost its heat, covering the bed with glasses, &c. to keep out the frost; this should be done in December; if the seeds are good, and as the spring advances the pots are refreshed with water, the plants will come up the beginning of April, when they should be frequently but sparingly watered; and constantly kept clean from weeds.

As the summer advances, if the plants are shaded in the heat of the day, it will greatly promote their growth; but in warm weather they must be open all night to receive the dew, so should only be covered in the middle of the day: with this management the plants will rise to the height of five or six inches the first summer.

The fruit of the Arbutus is said to have constituted part of the food of mankind in the early ages, "*Arbutos fœtus montanaque fragra legebant*;" though of all the wild fruits it must have been the most disgusting. The antients themselves named it *Unedo*, and Pliny gives the reason, "*cui nomen ex argumento fit unum tantum edendi*." However disagreeable the fruit may have been, its shade was thought inviting. Horace says of it,

Nunc viridi membra sub Arbuto stratus.

But Virgil, who was as good a judge, describes its foliage as rather thin:

Et quæ vos rara viridis tegit Arbutus umbra. ECL. vii.

BUXUS. The Box. This we begin to proscribe our gardens, (and indeed bees are no friend to it) tho' it should not yet be banished from our care, because the excellency of the wood does commute for the disagreeableness of its smell: Therefore let us furnish our cold and barren hills and declivities with this useful shrub, I mean the taller sort; for dwarf and more tonfile in due place. It will increase abundantly of slips set in March, and towards Bartholomew-tide, as also of the seeds contained in the cells. These trees rise naturally at Boxley in Kent in abundance, and the county of Surry, giving name to that chalky hill (near the famous Mole or Swal-

N O T E S.

* Of the Box there is only one species, and in the Sp. Pl. it stands simply with the name *Buxus*. There are, however, many varieties.

It is of the class and order *Monoecea Tetrandria*.

The Box tree is propagated from cuttings put down in autumn, and kept watered till they have struck root. It may also be raised from seeds sown soon after they are ripe in a shady border, and well watered in dry weather.

This tree grows luxuriantly, and in great abundance, upon Box-hill, at Darking in Surry, which place may be said to rival Virgil's Cytorus:

Et juvat undantem buxo spectare Cytorum. GEORG. ii.

The Box tree makes a fine and chearful appearance in Evergreen quarters. When cut down, the wood sells at a high price; a sufficient encouragement for the planter to raise it for sale.

This beautiful Evergreen was much esteemed by the antients for use as well as ornament. They made combs of it as we do at this day.

Multifido Buxus quæ tibi dente datur. MART.

They also formed it into musical instruments to be played upon by the mouth.

Si buxos inflare juvat VIRG.

————— non illos carmina vocum,

Longave multifori delectat tibia buxi. OVID

Among the Romans these trees were clipped into various forms, a practice quite exploded by our modern improvers in gardening. Martial, in his description of Bassus's country-house, lets us into the taste of the Roman gardens: These, says he, contain Myrtles, Box, and Plane trees.

————— otiosis ordinata myrtetis,

Viduaque platano, tonsilique buxeto.

Epig. Lib. iii.

low) whither the Ladies, Gentlemen, and other water-drinkers from the neighbouring Ebesham Spaw, often resort during the heat of summer to walk, collation, and divert themselves in those antilex natural alleys and shady recesses, among the Box trees, without taking any such offence at the smell which has of late banished it from our groves and gardens; when, after all, it is infinitely to be preferred for the bordering of flower-beds and flat embroideries, to any sweeter less-lasting shrub whatever, subject, after a year or two, to grow dry, sticky, and full of gaps; which Box is so little obnoxious to, that, braving all seasons, it needs not to be renewed for twenty years together, nor kept in order with the garden-sheers above once or twice a year; and immediately upon that, the casting water upon it, hinders all those offensive emissions which some complain of. But whilst I speak in favour of this sort of edging, I only recommend the use of the Dutch Box, (rarely found growing in England) which is a pumil dwarf kind, with a smaller leaf, and slow of growth, and which needs not be kept above two inches high, and yet grows so close, that beds bordered with boards keep not the earth in better order; beside, the pleasantness of the verdure is incomparable.

One thing more I think fit to add; that it may be convenient once in four, five, or six years, to cut off the strings and roots which straggle into the borders, with a very sharp spade, that they may not prejudice the flowers, and what else one plants in them.

I need not speak much of the uses of this tree, (growing in time to considerable stature) so continually sought after for many utensils, being so hard, close, and ponderous as to sink like lead in water; and therefore of special use for the Turner, Engraver, Carver, Mathematical Instrument, Comb, and Pipe-maker (*Si buxos inflare juvat* — Claud.) who give great prices for it by weight, as well as measure; and by the seasoning, and divers manner of cutting, vigorous infolations, politure and grinding, the roots of this tree (as of even our common and neglected thorn) do furnish the Inlayer and Cabinet-makers with pieces rarely undulated, and full of variety: Also of Box are made wheels or shivers, as our Ship-carpenters call them; and pins for blocks and pulleys; pegs for musical instruments; nut-crackers, weavers' shuttles, hollar-sticks, bump-sticks, and dressers for the shoemaker, rulers, rolling-pins, pestles, mall-

B. b. b

BOOK II. balls, beetles, tops, tables, chefs-men, screws, male and female, bobins for bone-lace, spoons, nay the stoutest axle-trees; but above all,

non ultima belli
Arma Puellaris; Laqueos hæc nectit Amanrûm,
Et venatricis disponit retia Formæ. COULET Pl. Lib. vi.

Box combs bear no small part
In the militia of the female art;
They tie the links which hold our gallants fast,
And spread the nets to which fond lovers haste.

The chemical oil of this wood has done the feats of the best guaiacum (though in greater quantity) for the cure of venereal diseases, as one of the most expert Physicians in Europe has confessed. The oil assuages the rooth-ach. But, says Rhodoginus, the honey which is made at Trevifond in Box trees (I suppose he means gathered among them; for there are few, I believe, if any, so large and hollow as to lodge and hive bees) renders them distracted who eat of it. Lib. xxiii. cap. xxv.

Y E W *.

Since the use of bows is laid aside amongst us, the propagation of the Yew tree (of which we have two sorts, and other places reckon more, as the Arcadian Black and Red; the Yellow of Ida, infinitely esteemed of old) is likewise quite forborn; but the neglect of it is to be deplored.

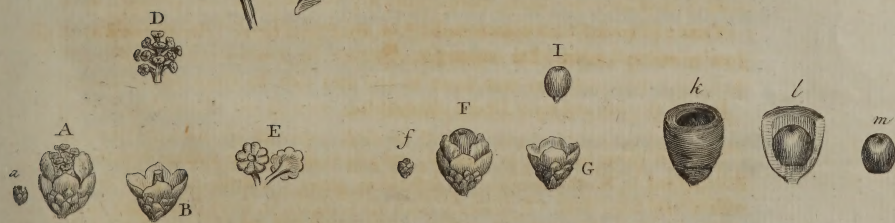
N O T E S.

* We have but one Species of this tree in England, viz.

TAXUS (*Baccata*) foliis approximatis. Lin. Sp. Plant. 1472. Yew tree with leaves growing near each other. The common Yew.

It is of the class and order *Diœcia Monadelphica*.

This tree grows naturally in England, and also in most of the northern countries of Europe, and in North-America. If suffered to grow, it will rise to a good height, with a very large stem. It naturally sends out branches on every side, which spread out, and are almost horizontal; these are closely garnished with narrow, stiff, blunt-pointed leaves, of a very dark green. The flowers come out from the side of the branches in clusters; the male flowers having many stamina, are more conspicuous



The Yew Tree.

J. Miller del. & sc.

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seeing that (besides the rarity of it in Italy and France, where but little of it grows) the barrenest grounds, and coldest of our mountains

CHAP. VI.

—— Aquilonem & frigora taxi.

might be profitably replenished with them: I say, profitably; for, besides the use of the wood for bows,

—— Ityraos taxi torquentur in arcus.

(for which the close and more deeply dyed is best) the forementioned artists in Box, Cabinet-makers, and Inlayers (particularly for Parquetè-floors) most gladly employ it; and in Germany they use to wainscot their stoves with boards of this material: also for the cogs of mills, posts to be set in moist grounds, and everlasting axle-trees, there is none to be compared with it; likewise for the bodies of lutes, theorbos, bowls, wheels, and

N O T E S.

than the female; these for the most part are upon different trees, but sometimes are upon the same tree; they appear the latter end of May, and the berries ripen in autumn.

The Yew tree has been generally cultivated for the pleasure-garden, both to clip into the figures of beasts, birds, &c. and also for hedges. Whoever is pleased with such figures in his garden, can raise no tree more proper for his purpose, as the branches and the leaves may be clipped and fashioned into almost any form or shape. But as this method is justly exploded, and as every one who has the least pretension to taste must always prefer a tree in its natural growth to those monstrous figures, the Yew is now chiefly planted for wilderness quarters, as also for hedges, for which service it is excellently well adapted, as no tree bears clipping so well.

These trees may be easily propagated by sowing their berries in autumn, as soon as they are ripe, (without clearing them from the pulp which surrounds them, as hath been frequently directed) upon a shady bed of fresh undunged soil, covering them over about half an inch thick with the same earth.

In the spring the bed must be carefully cleared from weeds, and if the season proves dry, it will be proper to refresh the bed with water now and then, which will promote the growth of the seeds, many of which will come up the same spring, but others will remain in the ground until autumn or the spring following; but where the seeds are preserved above ground till spring before they are sown, the plants never come up till the year after; so that by sowing the seeds as soon as they are ripe, there is often a whole year saved.

These plants, when they come up, should be constantly cleared from weeds, which, if permitted to grow amongst them, will cause their bottoms to be naked, and frequently destroy the plants when they continue long undisturbed.

In this bed the plants may remain two years; after which, in autumn, there should be a spot of fresh undunged soil prepared, into which they should be removed the be-

BOOK II. pins for pulleys; yea, and for tankards to drink out of: Whatever Pliny reports concerning its shade, and the stories of the air about Thasius, the fate of Cativulcus, mentioned by Cæsar, and the ill report which the fruit has vulgarly obtained in France, Spain, and Arcadia: But,

Quam multa arboribus tribuuntur crimina falsa?

How are poor trees traduc'd?

The toxic quality was certainly in the liquor, which those good fellows tipped out of those bottles, not in the nature of the wood; which yet he affirms is cured of that venenous quality, by driving a brazen wedge into the body of it. This I have never tried, but that of the shade and fruit I have frequently, without any deadly or noxious effects: so that I am of opinion, that the tree which Sestius calls Smilax, and our Historian thinks to be our Yew, was some other wood; and yet I acknowledge that it is esteemed noxious to cattle when it is in the seeds, or newly sprouting; though I marvel there appears no more such effects of it, both horses and other cattle being free to brouse on it, where it naturally grows: But what is very odd, if true, is that which the late Mr. Aubrey recounts (in his

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beginning of October, planting them in beds about four or five feet wide, in rows about a foot asunder, and the same distance from each other in the rows, observing to lay a little mulch upon the surface of the ground about their roots, as also to water them in dry weather until they have taken root; after which they will require no farther care, but to keep them clear from weeds in summer, and to trim them according to the purpose for which they are designed.

In these beds they may remain two or three years, according as they have grown, when they should again be removed into a nursery, placing them in rows at three feet distance, and the plants eighteen inches asunder in the rows; observe to do it in autumn, as was before directed, and continue to trim them in the summer season, according to the design for which they were intended; and after they have continued three or four years in this nursery, they may be transplanted where they are to remain; always observing to remove them in autumn where the ground is very dry, but on cold moist land it is better in the spring.

These trees, tho' of slow growth, do sometimes arrive at a considerable size. Mr. Pennant mentions one in Fontingal church-yard, in the Highlands of Scotland, whose ruins measured fifty-six feet and a half in circumference.

Of the Yew there is a variety with short leaves, which appear very ornamental in plantations. There is also another with striped leaves of great value amongst the variegated tribes. These are increased by layers, but the striped sort must be planted upon a barren soil, otherwise it will become plain.

Miscellanies) of a Gentlewoman that had long been ill, without any benefit from the Physician; she dreamed that a friend of her's, deceased, told her mother, that if she gave her daughter a drink of Yew pounded, she should recover; it was accordingly given her, and she presently died. The mother being almost distracted for the loss of her daughter, her chamber-maid, to comfort her, said, Surely, what she gave her was not the occasion of her death, and that she would adventure on it herself; she did so, and died also! Whether all this be but a dream, I cannot tell, but it was haply from these lugubrious effects, that garlands of *Taxus* were usually carried at funerals, as Statius implies in *Epicedium Vernæ*: However, to prevent all funest accidents, I commend the tree only for the usefulness of the timber, and hortulan ornament. That we find it so universally planted in our church-yards, was, doubtless, from its being thought a symbol of immortality, the tree being so lasting, and always green. Our bee-masters banish it from about their apiaries.

One thing more, whilst I am speaking of this tree: It minds me of that very odd story I find related by Mr. Cambden, of a certain amorous clergyman, that falling in love with a pretty maid, who refused his addresses, cut off her head; which being hung upon a Yew tree till it was rotten, the tree was reputed so sacred, not only whilst the virgin's head hung on it, but as long as the tree itself lasted; to which the people went in pilgrimage, plucking and bearing away branches of it, as an holy relick, whilst there remained any of the trunk, persuading themselves, that those small fine veins and filaments (resembling hairs between the bark and the body of the tree) were the hairs of the virgin: But what is yet stranger, the resort to this place, (then called Houton, a despicable village) occasioned the building of the now famous town of Halifax, in Yorkshire, which imports *Holy Hair*. By this, and the like, may we estimate what a world of impostures have, through craft and superstition, gained the repute of holy places, abounding with rich oblations (their *Devotas*).—Pliny speaks of an old Lotus tree in a grove near Rome, upon which the Vestals present (as our Nuns) were used to hang their hair cut off at their profession. Lib. xvi. cap. xliii.

I may not in the mean time omit what has been said of the true *Taxus* of the antients, for being a mortiferous plant. Dr. Belluccio, President of the Medical Garden at Pisa in Tuscany, (where they have this curiosity) affirms, that when his gardeners clip it, as sometimes they do, they are

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not able to work above half an hour at a time, it makes their heads so ake: But the leaves of this tree are more like the Fir, and is very bushy, furnished with leaves from the very root, and seeming rather an hedge than a tree, though it grows very tall.

This English Yew tree is easily produced of the seeds, washed and cleansed from their mucilage, then buried and dried in sand a little moist, any time in December, and so kept in some vessel in the house all winter, and in some cool shady place abroad all the summer; sow them the spring after. Some bury them in the ground like Haws; it will commonly be the second winter before they peep, and then they rise with their caps on their heads. Being three years old, you may transplant them, and form them into standards, knobs, walks, hedges, &c. in all which works they succeed marvellous well, and are worth our patience for their perennial verdure and durableness. I do again name them for hedges, preferable, for beauty and a stiff defence, to any plant I have ever seen, and may, upon that account, without vanity, be said to have been the first who brought it into fashion, as well for defence, as for a succedaneum to Cypress, whether in hedges or pyramids, conic-spires, bowls, or what other shapes, adorning the parks or larger avenues with their lofty tops, thirty feet high, and braving all the efforts of the most rigid winter, which Cypress cannot weather. I have said how long lasting they are, and easily to be shaped and clipped; nay, when cut down, they thrive: But those which are most superannuated, and perhaps of many hundred years standing, perish if so used.

He that in winter should behold some of our highest hills in Surry clad with whole woods of these two last sorts of trees, for divers miles in circuit (as in those delicious groves of them, belonging to the Honourable, my Noble Friend, the late Sir Adam Brown, of Bechworth Castle) from Box-Hill, might, without the least violence to his imagination, easily fancy himself transported into some new or enchanted country; for, if in any spot of England,

Hic ver assiduum, atque alienis mensibus ætas. VIRG.

— 'tis here

Eternal spring and summer all the year.

Of which I have already spoken in the former Section.



The Holly Tree.
 Published Jan^y 1776. by A. Knapton, W. G. as the Act directs.

J. Miller del & sc.

HOLLY*.

Above all the natural greens which enrich our home-born store, there is none certainly to be compared to the *Agrifolium* (or *Acuifolium* rather) our Holly, so spontaneously growing here in this part of Surry, that the large Vale near my own dwelling, was antiently called Holmes-Dale, famous for the flight of the Danes: The inhabitants (of great antiquity in their manners, habits, and speech) have a proverb, *Holmes-Dale never won; ne, never shall*. It had once a fort, called Holmes-Dale Castle: I know not whether it might not be that of Rygate; but leaving this uncertain, I return to the plant. I have often wondered at our curiosity after foreign plants, and expensive difficulties, to the neglect of the culture of this

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* Of the *Ilex* there are five Species, but I shall only take notice of two.

1. *ILEX (Aquifolium)* foliis ovatis acutis spinosis. Hort. Cliff. 40. *Ilex aculeata baccifera*. C. B. P. 425. *Prickly berry-bearing Ilex. The common Holly.*

The common Holly grows naturally in woods and forests in many parts of England, where it rises from twenty to thirty feet high, and sometimes more, but the ordinary height is not above twenty-five feet. The stem by age becomes large, and is covered with a grayish smooth bark; and those trees which are not lopped or browsed by cattle, are commonly furnished with branches the greatest part of their length, so form a sort of cone; the branches are garnished with oblong oval leaves about three inches long, and one and a half broad, of a lucid green on their upper surface, but pale on their under, having a strong midrib: the edges are indented and waved, with sharp thorns terminating each of the points, so that some of the thorns are raised upward and others are bent downward; these being very stiff cannot be handled without pain. The leaves are placed alternate on every side of the branches, and from the base of their foot-stalks the flowers come out in clusters, standing on very short foot-stalks; each of these sustain five, six, or more flowers. In some plants I have observed the flowers were wholly male, and produced no berries; in others I have observed female and hermaphrodite flowers, but upon some large old trees growing on Windsor Forest, I have observed all three upon the same trees. The flowers are of a dirty white, and appear in May; they are succeeded by roundish berries, which turn to a beautiful red about Michaelmas, but continue on the trees, if they are not destroyed, till after Christmas before they fall away — Of the common Holly there are several varieties with variegated leaves, which are propagated by the nursery gardeners for sale, but at present are little regarded, the old taste of filling gardens with shorn Evergreens being nearly abolished; however, in the disposition of the clumps or other plantations of Evergreen trees and shrubs, a few of the

Book II. vulgar, but incomparable tree, whether we propagate it for use and defence, or for sight and ornament.

— Mala furta hominum densis mucronibus arcens
Securum defendit inexpugnabilis hortum,
Exornatque simul, toto spectabilis anno,
Et numero, & viridi foliorum luce nitentum.

COULEN Pl. Lib. vi.

A hedge of Holly, thieves that would invade,
Repulses like a growing palifade;
Whose numerous leaves such orient greens invest;
As in deep winter do the spring arrest.

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most lively colours may be admitted, which will have a good effect in the winter-season, if they are properly disposed. As the different variegations of the leaves of Hollies, are by the nursery gardeners distinguished by different titles, I shall here mention the most beautiful of them by their common names.

Fair Phillis. Chohole. Milkmaid. Chimney-sweeper. Glory of the East. Glory of the West. Painted Lady. Fuller's Cream Holly. Broderick's Holly. Cheney's Holly. Partridge's Holly. Wife's Holly. Ellis's. Holly. Gray's Holly. Longstaff's. Holly. Bradley's best Holly. Blotched Yellow-berried Holly. Mason's. Copper-coloured Holly. Bench's Ninepenny Holly. Pritchett's Holly. Blind's. Cream Holly. Sir Thomas Franklin's Holly. Brittain's Holly. Bradley's Long-leaved Holly. Whitmell's Holly. Bradley's Yellow Holly. Bridgman's Holly. Wells's Holly. Glas's Holly. Bagshot's Holly. Brownrig's Holly. Hertfordshire White Holly. Common Blotched Holly. Yellow Blotched Hedge-Hog Holly. Silver Hedge-Hog Holly. Langton Holly.

2. *ILEX (Caroliniana)* foliis ovato-lanceolatis serratis. Hort. Cliff. 40. *Holly with oval, spear-shaped, sawed leaves.* *Aquifolium Caroliniense*, foliis dentatis, baccis rubris. Cateb. Carol. 1. p. 31. *Carolina Holly with indented leaves and red berries*, commonly called *Dabon Holly*.

This species of Holly grows naturally in Carolina, from whence the seeds were sent by the late Mr. Mark Catesby, who found the trees growing on a swamp at a distance from Charles-town, but it hath since been discovered in some other parts of North-America. This rises with an upright branching stem to the height of eighteen or twenty feet; the bark of the old stem is of a brown colour, but that of the branches or younger stalks is green and smooth, garnished with spear-shaped leaves, which are more than four inches long, and one and a quarter broad in the broadest part, of a light green and thick consistence; the upper part of the

Which makes me wonder why it should be reckoned among the unfortunate trees by Macrobius, Sat. lib. iii. cap. xvi. and by others, among the lucky; for so it seems they used to send branches of it, as well as of Oak (the most fortunate, according to the Gentile Theology) with their Strenæ, (New-Year's Gifts) begun, as Symachus tells us, by King Tattius, almost as old as Rome herself.

But to say no more of these superstitious fopperies, which are many, about this tree, we still dress up both our churches and houses, on Christmas and other festival days, with this cheerful green and rutilant berries.

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Leaves are sawed on their edges, each serrature ending in a small sharp spine; they stand alternately on every side the branches, upon very short foot-stalks. The flowers come out in thick clusters from the side of the stalks; they are white, and shaped like those of the common Holly, but are smaller; the female and hermaphrodite flowers are succeeded by small roundish berries in its native country, which make a fine appearance in winter, but they have not as yet produced fruit in England. This plant is tender, and requires a warm exposure.

The Ilex is of the class and order *Tetrandria Tetragynia*.

The manner of propagating the Holly is nearly the same as the Yew; only as the plants never appear until the second spring, instead of sowing the berries immediately, as was directed for the Yew, they may be buried in the ground, then taken up, and sown the autumn following. If the plants are sown as soon as they are gathered, they will undoubtedly come up the spring twelvemonth after; and this would be the most eligible, as well as the surest way of obtaining a crop, could we be certain of guarding them from mice during so long a space of time; for these animals, when once they find out the seeds, will soon, unless they are exterminated, effectually destroy a whole seminary. If the planter is not averse to run this hazard, the best method will be to sow the seeds soon after they are ripe. During the following summer the beds must be kept clean of weeds; traps must be constantly set for the mice; and, if the season should prove dry, it would assist the growth of the seeds to give them now and then a gentle watering. These precautions being observed, the plants will come up in the spring following.

In this seed-bed the plants may remain two years, and then should be transplanted in the autumn, into beds at about eight inches distance each way, where they may stand two years longer, during which time they must be constantly kept clean from weeds; and if the plants have thriven well, they will be strong enough to transplant where they are designed to remain; for when they are transplanted at that age, there will be less danger of their failing, and they will grow to a larger size than those which

Book II. Is there under heaven a more glorious and refreshing object of the kind, than an impregnable hedge of about four hundred feet in length, nine feet high, and five in diameter, which I can shew in my now ruined gardens at Say's Court (thanks to the Czar of Moscow*) at any time of the year, glittering with its armed and varnished leaves? The taller standards at orderly distances, blushing with their natural coral: It mocks the rudest assaults of the weather, beasts, or hedge-breakers,

Et illum nemo impunè laceffit.

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are removed when they are much larger; but if the ground is not ready to receive them at that time, they should be transplanted into a nursery in rows at two feet distance, and one foot asunder in the rows, in which place the plants may remain two years longer; and if they are designed to be grafted or budded with any of the variegated kinds, that should be performed after the plants have grown one year in this nursery; but the plants so budded or grafted should continue two years after in the nursery, that they may make good shoots before they are removed; though the plain ones should not stand longer than two years in the nursery, because when they are older they do not transplant so well. The best time for removing of Hollies is in the autumn, especially in dry land; but where the soil is cold or moist, they may be transplanted with great safety in the spring; if the plants are not too old, or if they have not stood long unremoved, there is great odds of their dying when removed.

The Holly is an excellent plant for hedges, and would claim the preference to the Hawthorne, were it not for the slowness of its growth while young, and the difficulty of transplanting the plants when grown to a moderate size. This will grow best in cold stony lands, where, if once it takes well, the hedges may be rendered so close and thick as to keep out all sorts of animals; it will grow to a considerable height, and be of long duration. These hedges may be raised by sowing the berries either in the place where they are designed to remain, or by planting young plants of three or four years growth; but as the berries continue in the ground an entire year before the plants appear, few persons care to wait so long; therefore the usual and best method is to plant the hedges with plants of the before-mentioned age. But where this is practised, they should be transplanted either early in the autumn, or deferred till toward the end of March; then the surface of the ground should be covered with mulch near their roots after they are planted, to keep the earth moist; and if the season should prove dry, the plants should be watered at least once a week, until they have taken root, otherwise they will be in danger of miscarrying; for which reason the autumnal planting is generally preferred to the spring, especially in dry grounds.—Columella's description of a good hedge is highly applicable to one made of Holly, "*Neu sit pecori, neu pervia furi.*"

* The Czar Peter the Great resided at Mr. Evelyn's house, in order that he might be near the yard at Deptford during his stay in England.

It is with us of two eminent kinds, the prickly and smoother leaved, or, as some term it, the Free Holly, not unwelcome, when tender, to sheep and other cattle. There is also of the White-berried, and a Golden and Silver, variegated in six or seven differences, which proceeds from no difference in the species, but accidentally, and naturæ lusu, as most such variegations do: since we are taught how to effect it artificially, namely, by sowing the seeds, and planting in gravelly soil, mixed with store of chalk, and pressing it hard down; it being certain, that they return to their native colour when sown in richer mould, and that all the fibres of the roots recover their natural food.

I have already shewed how it is to be raised of the berries (of which there is a sort bears them yellow, and propagate their colour) when they are ready to drop; this only omitted, that they should first be freed from their tenacious and glutinous mucilage by being washed, and a little bruised, then dried with a cloth, or else bury them as you do the Yew and Hips: and let the Forester receive this for no common secret, and take notice of the effect. If you will sow them in the berry, keep them in dry sand till March, remove them also after three or four years; but if you plant the sets, (which is likewise a commendable way, and the woods will furnish enough) place them northwards, as they do Quick: Of this might their living pales and enclosures be made, (such as the Right Honourable my Lord Dacres, somewhere in Suffex, has a park almost environed with, able to keep in any game, as I am credibly informed) and cut into square hedges it becomes impenetrable, and will thrive in the hottest as well as the coldest places. I have seen hedges, or, if you will, stout walls of Holly twenty feet in height, kept upright, and the gilded sort budded low, and in two or three places one above another, shorn and fashioned into columns and pilasters, architectonically shaped, and at due distance; than which nothing can possibly be more pleasant, the berry adorning the intercolumniations with scarlet festoons and encarpa. Of this noble tree one may take thousands of them, four inches long, out of the woods, (growing amongst the fallen leaves) and so plant them; but this should be before the cattle begin to crop them, especially sheep, who are greedy of them when tender: Stick them into the ground in a moist season, in spring, or early autumn, especially the spring, shaded (if it prove too hot and scorching) till they begin to shoot of themselves, and in very sharp weather, and during our Eastern Etesians, covered with dry straw or

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haunce; and if any of them seem to perish, cut it close, and you shall soon see it revive. Of these seedlings, and by this culture, I have raised plants and hedges full four feet high in four years: The lustier and bigger the sets are, the better; and if you can procure such as are a thumb's breadth thick, they will soon furnish into an hedge. At Dungeness, in Kent, they grow naturally amongst the very Beech and Pebbles; but if your ground be stiff, loosen it with a little fine gravel: This rare hedge, the boast of my Villa, was planted upon a burning gravel, exposed to the meridian sun; for it refuses not almost any sort of barren ground, hot or cold, and often indicates where coals are to be dug.

True it is, that time must bring this tree to perfection; it does so to all things else, & *posteritati pangimus*. But what if a little culture about the roots, (not dunging, which it abhors) and frequent stirring of the mould, double its growth? We stay seven years for a tolerable Quick; it is worth staying thrice seven for this, which has no competitor. And yet there is an expedient to effect it more insensibly, by planting it with the Quick: Let every fifth or sixth be a Holly-set, they will grow up infallibly with your Quick; and as they begin to spread, make way for them by extirpating the White Thorn, till they quite domineer: Thus was my hedge first planted, without the least interruption to the fence, by almost pleasant metamorphosis. But there is also another, not less applauded, by laying along well-rooted sets, a yard or more in length, and stripping off the leaves and branches, letting only something of the tops appear: These, covered with a competent depth of earth, will send forth innumerable suckers, which will suddenly advance into an hedge; and grows as well under the shade as sun, provided you keep them weeded; and now and then loosen the earth, towards which, if through extreme neglect, or other accident, it grow thin, being close cut down it will fill and become stronger and thicker than ever.

Of this stately shrub, as some reckon it, there is lately found an Holly, whose leaves are as thorny and bristly, not only at the edges, but all over, as an hedge-hog, which it may properly be called; and I think was first brought by Mr. London out of France.

The timber of the Holly (besides that it is the whitest of all hard woods, and therefore used by the Inlayer, especially under thin plates of ivory, to render it more conspicuous) is for all sturdy uses; the Mill-wright,

Turner, and Engraver prefer it to any other: It makes the best handles and stocks for tools, flails, the best riding-rods, and carters' whips; bowls, chivers, and pins for blocks: Also it excels for door-bars and bolts; and as of the Elm, so of this especially, they made even hinges and hooks to serve instead of iron, sinking in the water like it; and of the bark is composed our bird-lime, thus:

Peel a good quantity of the bark about Midsummer; fill a vessel with it, and put to it spring-water; then boil it till the gray and white bark rise from the green, which will require near twelve hours boiling; then taking it off the fire, separate the barks, the water first well poured off. Then lay the green bark on the earth, in some cool vault or cellar, covering it with any sort of green and rank weeds, such as Dock, Thistles, Hemlock, &c. to a good thickness; thus let it continue near a fortnight, by which time it will become a perfect mucilage; then pound it all exceedingly in a stone mortar, till it be a tough paste, and so very fine as no part of the bark be discernable: This done, wash it accurately well in some running stream of water, as long as you perceive the least ordure or motes in it, and so reserve it in some earthen pot, to purge and ferment, scumming it as often as any thing arises for four or five days, and when no more filth comes, change it into a fresh vessel of earth, and reserve it for use, thus: Take what quantity you please of it, and in an earthen pipkin add a third part of capon's or goose-grease to it, well clarified, or oil of Walnuts, which is better; incorporate these on a gentle fire, continually stirring it till it be cold, and thus your composition is finished. But to prevent frosts, (which, in severe weather, will sometimes invade it on the rods) take a quarter of as much oil of Petroleum as you do of grease, and no cold whatever will congeal it. The Italians make their *Vischio* of the berries of the mistletoe of trees, (and indeed it is from this it is said of the Thrush, *Exitum suum cacat*, that bird being so exceeding devourers of them) treated much after the same manner; but then they mix it with nut-oil, an ounce to a pound of lime, and taking it from the fire, add half an ounce of turpentine, which qualifies it also for the water. Great quantities of bird-lime are brought to us out of Turkey, and from Damascus, which some conceive to be made of Sebestens, finding sometimes the kernels. This lime is of a greener colour, subject to frosts, and impatient of wet, nor will last above a year or two good. Another sort comes also out of Syria, of a yellow hue; likewise from Spain, whiter than the rest, which will resist the water, but is of an ill scent. I have been told that the Cortex of our Lantana, or Wayfaring Shrub, will make as

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good bird-lime as the best. But let these suffice, being more than as yet any one has published. The superior leaves of Holly trees, dried to a fine powder and drank in white wine, are prevalent against the stone, and cure fluxes; and a dozen of the mature berries, being swallowed, purge phlegm without danger: To which the learned Mr. Ray (in Append. Plant. Angl.) adds a zythogalum, or posset, made of milk and beer, in which is boiled some of the most pointed leaves, for assuaging the torment of the cholic, when nothing else has prevailed.

L A U R E L *.

Lauro-Cerasus. The Cherry-Bay. From the use we commonly put this shrub to, it seems as if it had been only destined for hedges, and to cover bare walls: Being planted upright, and kept to the standard, by cutting away the collateral branches, and maintaining one stem, it will rise to a very considerable tree, resembling (for the first twenty years) the most beautiful-headed Orange in shape and verdure, and arriving in time to emulate even some of our lusty timber-trees; so as I dare pronounce it to be one of the most proper and ornamental trees for walks and avenues of any growing.

N O T E S.

* This tree was formerly called Lauro-Cerasus, but Linnæus has now made it a species of the Prunus. In the Sp. Pl. it is titled PRUNUS (*Lauro-Cerasus*) floribus racemosis, foliis sempervirentibus dorso biglandolosis. In Hort. Cliff. 185, it is called Padus foliis sempervirentibus lanceolato-ovatis. The common Laurel, or Cherry-Bay.

It is of the class and order *Icosandria Monogynia*.

The young leaves of the Laurel begin to open about the twelfth of March, and are generally all out by the middle of April. The flowers are white; and tho' small, yet being clustered together, they make a tolerable appearance: But the berries afford the greatest beauty, being large, and when ripe very black.

This tree is a native of the East, and grows naturally about the Black Sea. It was first brought into Europe by Clusius, in the year 1576; and, being easily propagated, is now spread over Italy, and the greatest part of Europe.

The Laurel is propagated either from the seeds or cuttings. If the former method is practised, the seeds must be gathered from the trees when they are full ripe: This will be known by their being quite black, which is generally about the beginning of October. These seeds should be sown directly in beds of light earth, half an inch deep, which must be afterwards hooped over, to be covered in very severe frosts. A hedge of furze bushes also should be made around them, to break the force of the free-

Pity it is they are so abused in the hedges, where the lower branches growing sticky and dry, by reason of their frequent and unseasonable cuttings (the genius of the tree being to spend much in wood) they never succeed after the first six or seven years; but are to be new-planted again, or abated to the very roots for a fresh shoot, which is best, and soon would furnish the places. In a word; as to the pruning of Evergreen hedges, there is no small skill and address to be used, in forming and trimming them for beauty and stability; leave the lower parts next the ground broader (two feet were sufficient for the thickness of the tallest hedge) than the tops, gradually, so as not much to exceed a foot breadth

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zing black winds, and secure the seeds, together with the mats, from being destroyed. This is a much safer method than covering the beds with litter, which, if neglected to be taken off when the frost is over, will retain the rains which generally succeed such weather, sodden the beds, and make them so wet as frequently to destroy the whole of the expected crop. The seeds being sown, and preserved with the above care, will appear in the spring. During the following summer they should be kept clear of weeds, as well as watered in dry weather; and all the ensuing winter they must remain untouched in their beds, the furze hedge still standing till the frosty weather is past; for if these young seedlings are planted out in the autumn, the major part of them will be in danger, before the winter is expired, of being thrown out of the ground by the frost; and not only so, but of being really killed by it, as they are not very hardy at one year old. In the spring, therefore, when the bad weather is over, let them be planted out in the nursery-ground, in rows two feet asunder, and the plants a foot and a half distant in the rows, where they may stand till they are planted out for good.

Trees raised from seeds generally grow more upright, and seldom throw out so many lateral branches as those reared from cuttings; nevertheless, as the expectation of a crop from seeds has so often failed, notwithstanding great care has been used, and as the difficulty of procuring the seeds, and preserving them from the birds, has been very great, the most certain and expeditious method of raising quantities of these trees is by cuttings, and is as follows:

In the month of August the cuttings should be gathered, about a foot and a half in length. They will thrive the better for having a bit of the last year's wood at the end, though without this they will grow exceedingly well. The under leaves should be cut off a foot from the thick end of the cutting, which must all be planted about a foot deep in the ground; the other half foot, with its leaves, being above it. No distance need be observed in planting these cuttings, which may be set as thick as you please, though the ground for raising them should be sheltered, lest the winds, which are frequently high at this time of the year, or soon after, should loosen the plants just when they are going to strike root, if not wholly blow them out.

The weather when the cuttings are to be planted should be either rainy or cloudy; and if no showers should fall in August, the work must be deferred till they do; for

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at the utmost verge, (as architects diminish walls of stone and brick from the foundation) for they will else be apt to bend and swag, (especially when laden with winter snows or ice) grow too thick, heat, wither, and foul within, dry and sticky especially, when it were more than time they were cut close to the earth, for a fresh and verdant spring; and this method is to be practised in all hedges whatsoever.

But would you yet improve the standard, which I celebrate, to greater and more speedy exaltation, bud your Laurel on the Black Cherry stock to what height you please: This I had from an ocular testimony, who was

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if cuttings are planted in August when the weather is parching and dry, they will be burnt up, without great care and trouble in shading and watering. Neither is cloudy or rainy weather only to be recommended in planting these cuttings, but a shady situation also, either under a north wall, or in beds which are covered the greatest part of the day with the umbrage of large trees. This shady situation is very necessary for them; since, though the weather be rainy and cloudy when they are planted out, yet should it prove fair afterwards, the sun will soon dry up the moisture at that season, and endanger the plants, if they are not constantly watered and protected with a shade; which at once shews the expediency of pitching on a spot where such a conveniency is natural.

If these cuttings are planted in August, they will take root before winter, especially if they have shade, and water in dry weather; but they should remain undisturbed till the spring twelvemonth following, in order to acquire strength to be planted in the nursery. During the summer, they will require no other trouble than watering in dry weather, and keeping clean from weeds; and by the autumn they will have made a shoot of perhaps a foot or more in length. In the beds, nevertheless, they should remain till the spring, when they should all be carefully taken out, and planted in the nursery, as was directed for the seedlings.

When these trees are intended to form a large plantation, any time during the winter will be proper for the work, though I would recommend the month of October as the most favourable season. The ground ought to be prepared for their reception by plowing; and they should be planted in holes made all over it, at one yard asunder. When they begin to touch each other, do not immediately thin them, but suffer them to remain unthinned two or three years longer, by which means they will draw one another up to regular stems. When you begin to thin them, it must be done sparingly, and in small quantities, only taking out a weakly plant here and there, to make room for the more vigorous shooting of the others, lest the cold, entering the plantation too much at once, should retard its growth, if not wholly destroy it.

The danger of losing these plants is, I believe, only when they have been used to grow close, and the cold is suffered to rush in upon them all of a sudden; but where they have been planted on bleak or exposed places singly, I seldom ever knew a plant

more than somewhat doubtful of such alliances; though something like it CHAP. VI.
in Palladius, speaks it not so impossible:

Inferitur Lauro Cerasus, partuque coacto
Tingit adoptivus virginis ora pudor.

A Cherry graft on Laurel stock, does stain
The virgin fruit in a deep double grain.

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of this tree killed by the cold. However, let these plantations be continued to be thinned with caution till the general fall.

The Laurel is now so far naturalized to us, as to grow well in almost any of our soils or situations: so that plantations of this tree may be made in any place where there is a conveniency. In Italy there are numerous woods consisting entirely of these trees; and although England at present cannot boast of many plantations of this kind, yet his Grace the Duke of Bedford has set a noble example to men of fortune, at Wooburn, where he has planted one hill solely with Laurels, which thrive exceedingly; as do those also which are mixed in great quantities with the other Evergreens, throughout his whole plantations.

Besides the common Laurel there is another kind entitled by Tournefort, *Inst.* 628, *Lauro-Cerasus Lusitanica minor*. *The Smaller Portugal Laurel*; called, in its native country, *Azsaureiro*.

The leaves of this shrub are shorter than those of the common Laurel, approaching nearer to an oval form; they are of the same consistence, and of a lucid green, which, mixing with the red branches, make a beautiful appearance. The flowers are produced in long loose spikes from the side of the branches; they are white, and shaped like those of the common Laurel, appearing in June, and are succeeded by oval berries smaller than those of the common Laurel; they are first green, afterward red, and when ripe are black, inclosing a stone like the Cherry.

This kind may be propagated in the same way as the common Laurel, either by cuttings, layers, or seeds. If the cuttings are planted at the same season, and in the same way as hath been directed for the common Laurel, they will take root very freely; or if the young branches are laid in the autumn, they will take root in one year, and may then be removed into a nursery, where they may grow a year or two to get strength, and then be transplanted where they are to remain.

This tree is much harder than the common Laurel; for in the severe frost of the year 1740, when great numbers of Laurels were entirely killed, and most of them lost their verdure, this remained unhurt in perfect verdure, which renders it more valuable; and as by the appearance of some trees now growing in the gardens, they seem as if they would grow to a large size, so it is likely to be one of the most ornamental Evergreens we have.

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They are raised of the seeds or berries with extraordinary facility, or propagated by layers, taleæ, and cuttings, set about the latter end of August, or earlier at St. James's tide, wherever there is shade and moisture. Besides that of the wood, the leaves of this Laurel, boiled in milk, impart a very grateful taste of the Almond; and of the berries, or cherries rather, (which poultry generally feed on) is made a wine, to some not unpleasant. I find little concerning the uses of this tree; of the wood are said to be made the best plow-handles. Note, that this rare tree was first brought from Civita-Vecchia into England by the Countess of Arundel, wife to that illustrious patron of arts and antiquities, Thomas Earl of Arundel and Surry, great great grandfather to his Grace the present Duke of Norfolk, whom I left sick at Padua, where he died, highly displeased at his grandson Philip's putting on the Friar's frock, tho' afterwards the Purple, when Cardinal of Norfolk. After all, I cannot easily assent to the tradition, though I had it from a noble hand: I rather think it might first be brought out of some more northerly clime, the nature of the tree so delighting and flourishing, in the shady and colder exposures, with an abhorrence of heat.

BAY TREE *.

Laurus Vulgaris. The Bay Tree. The learned Isaac Vossius, and Etymologists, are wonderfully curious in their conjectures concerning its derivation; *a Laude*, says Isidore. And from the ingenious Poet, we learn how it became sacred to Apollo, the Patron of the Wits, and ever since the Meed of Conquerors and heroic Persons. But leaving fiction, we pass to

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* Of the *Laurus* there are no less than eleven Species enumerated by Linnæus, but it will be unnecessary in this place to take notice of more than one, viz.

LAURUS (Nobilis) foliis venosis lanceolatis perennantibus, floribus quadrifidis dioicis. Lin. Sp. Pl. 529. *Laurus Vulgaris*. B. P. 460. *The Bay Tree*.

It is of the class and order *Enneandria Monogynia*.

This shrub is propagated by seeds, cuttings, layers, and suckers, in a manner well known to every gardener. As this beautiful plant will grow under the dripping of trees, it is qualified for adorning the borders of woods and pleasure grounds. The leaves begin to open about the middle of March, and are quite out by the beginning of May. The flowers are of a light yellow colour, but make no show. It is a native of Italy. It is beyond a doubt that the *Bay Tree*, and not the *Laurel*, is the *Laurus* of the antients. The *Laurel* was not known in Europe till the latter end of

the culture of this noble and fragrant tree, propagated both by seeds, cuttings, suckers, and layers. They (namely the berries) should be gathered dropping ripe: Pliny has a particular process for the ordering of them, not to be rejected, which is to gather them in January, and spreading them till their sweat be over, he then puts them in dung, and sows them: As for the steeping in wine, water does altogether as well: Others wash the seeds from their mucilage, by breaking and bruising the glutinous berries, then sow them in rich ground in March, by scores in a heap; and indeed so they will come up in clusters, but nothing so well, nor fit for transplantation, as where they are interred with a competent scattering, so as you would furrow pease. Both this way, and by setting them apart, which I most commend, I have raised multitudes, and that in the berries, kept in sand till the spring, without any farther preparation; only for the first two years they should be defended from the piercing winds, which frequently destroy them; and yet the scorching of their tender leaves ought not to make you despair, for many of them will recover beyond expectation; nay, though quite cut down, they repullulate and produce young suckers. Such as are raised of berries may at three years growth be transplanted; which let alone too long, are difficult to take.

This aromatic tree greatly loves the mother's shade, (under which nothing else will prosper) yet thrives best in our hottest gravel, having once

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the sixteenth century, about which time it was brought from Trebizond to Constantinople, and from thence it spread over most parts of Europe. Besides, *our* Laurel has not the properties ascribed by the antients to *their* Laurus. Virgil says it has a fine smell, which the Laurel has not:

Et vos, O Lauri, carpam, et te proxime, Myrte,

Sic positæ, quoniam *suaves* miscetis *odores*. ECL. ii.

And in the sixth Æneid, "Oderatum Lauri nemus."

The Pythian Priests chewed the leaves of this tree before she was placed upon the sacred Tripod. These being used after an abstinence of three days, naturally produced that wild enthusiasm with which her Oracles were always attended. From its being thus used it obtained the name of the "Prophetic Tree." Whence Claudian,

— venturi præscia Laurus.

Amongst the antients, Crowns of Laurel were worn by successful Generals when they made their triumphal entries: Apollo, when he made this tree his own, says,

Tu ducibus Latiis aderis, cum læta triumphum

Vox canet; et longæ visent Capitolia pompæ. OVID.

BOOK II.

passed those first difficulties: Age, and culture about the roots, wonderfully augment its growth; so as I have seen trees near thirty feet high of them, and almost two feet diameter. They make walking-staves, straight, strong, and light for old Gentlemen; and are fit also both for arbour and palisade work, so the gardener understand when to prune and keep them from growing too woody. And here I cannot but take notice of those beautiful case-standards, which of late you have had out of Flanders, &c. with stems so even and upright, heads so round, full, and flourishing, as seem to exceed all the topiary ornaments of the garden, that one tree of them has been sold for more than twenty pounds; tho' now, the mystery revealed, the price be much abated; and, doubtless, as good might be raised here, (without sending beyond sea for them) were our gardeners as industrious to cultivate and shape them. Some there are, who imagine them of another species than our ordinary Bay, but erroneously. I wonder we plant not whole groves of them and abroad; they being hardy enough, grow upright, and would make a noble Daphneon. The berries are emollient, sovereign in affections of the nerves, cholics, &c. they make good gargarisms, baths, salves, and perfumes: Of Bay-leaves dried in a fire-pan and reduced to a fine powder, as much as will cover half a crown, being drank in wine, seldom fails of curing an ague. And some have used the leaves instead of cloves, imparting its relish in sauce, especially of fish: and the very dry sticks of the tree, strewed over with a little powder or dust of sulphur, and vehemently rubbed against one another, will immediately take fire, as will likewise the wood of an old Ivy; nay, without any intente addition, by friction only.

Amongst other things, it has of old been observed that the Bay is ominous of some funest accident, if that be so accounted which Suetonius (in Galba) affirms to have happened before the death of the monster Nero, when these trees generally withered to the very roots in a very mild winter: and much later; that in the year 1629, when at Padua, preceding a great pestilence, almost all the Bay trees about that famous University grew sick and perished: *Certo quasi presagio*, says my Author, *Apollinem Musasque, subsequenti anno urbe illa bonarum literarum domicilio excessuras.*—But that this was extraordinary, we are told the Emperor Claudius, upon occasion of a raging pestilence, was, by his Physicians, advised to remove his court to Laurentium, the aromattick emissions of that tree being in such reputation for clearing the air, and resisting contagion; upon which account I question not but Pliny, the Nephew, was so frequently at his beloved

Laurentium, so near the city. Besides, those trees were extolled for their virtue against lightning, which Tiberius so exceedingly dreaded, that when it came with thunder, he would creep under his bed to avoid it, shading his head with the boughs. The story of the branch in the bill of the white hen, let fall into the lap of Livia Drusilla, being planted, prospered so floridly, as made it reputed so sacred as to use it for impaling the heads of the triumphing Emperors, and to adorn the Limina of the Temples and Royal Palace of the great Pontiff; and thence called *Janitricæ Cæsarum*.

CHAP. VI.

Cur tamen apposita velatur janua lauro;

Cingit & Augustas arbor opaca fores?

Num quia perpetuos meruit domus ista triumphos? OVID.

As still at present in Rome, and other cities, they use to trim up their churches and monasteries on solemn festivals, when there is station and indulgences granted in honour of the saint or patron; as also on occasion of signal victories, and other joyful tidings; and those garlands, made up with hobby-horse tinsel, make a glittering show, and rattling noise when the air moves them.

With the leaves of Laurel were made up the dispatches and letters, which were sent to the Senate from the victorious General: The spears, lances, and fasces, navy tents and ships, &c. were all dressed up with Laurels; and in triumph every common soldier carried a sprig in his hand, as we may see in the best bas-relievo of the antients, as of virtue to purge them from blood and slaughter. And now, after all this, might one conjecture by a mere inspection of those several sculps, statues, and medals yet extant, representing the heads of Emperors, Poets, &c. the wreaths and coronets to be composed of a more flexible and compliant species than the common Bay, and more applicable to the brows, except where the ends and stalks of the tender branch were tied together with a lemnisc or ribbon. And there be yet who contend for the Alexandrian Laurel, and the Tinus as more ductile, but without any good evidence. Pliny, I find, says nothing of this question; naming only the Cyprian and Delphic; besides, the figure, colour of the rind and leaf, crackling in the fire, which it impugns, (as it is said it does lightning) gives plainly the honour of it to the common Bay. We say nothing of its sacred use in the Gentile lustration, purgation, and several other attributes.

C H A P. VII.

OF FENCES, QUICK-SETS, &c.

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OUR main plantation is now finished, and our forest adorned with a just variety: But what is yet all this labour, but loss of time and irreparable expence, unless our young and (as yet) tender plants be sufficiently guarded with munitions from all external injuries? For, as old Tuffer,

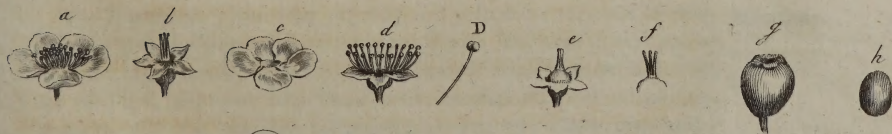
*If cattle or coney may enter to erop,
Young Oak is in danger of losing his top.*

But with something a more polished stile, though to the same purpose, the best of Poets,

*Texendæ fepes etiam, & pecus omne tenendum est:
Præcipuè, dum frons tenera, imprudensque laborum:
Cui, super indignas hyemes, solemque potentem,
Silvestres uri assiduè, capreaque sequaces
Illudunt: Pascuntur Oves, avidæque juvenæ.
Frigora nec tantum cana concreta pruina,
Aut gravis incumbens scopulis arentibus ætas;
Quantum illi nocuere greges, durique venenum
Dentis, & admoso signata in stirpe cicatrix.* GEORG. II.

Guard, too, from cattle thy new-planted ground,
And infant-vines that ill can bear a wound:
For not alone by winter's chilling frost,
Or summer's scorching beam the young are lost;
But the wild buffaloes and greedy cows,
And goats and sportive kids the branches browse;
Not piercing colds, nor Sirius' beams that beat
On the parcht hills, and split their tops with heat,
So deeply injure, as the nibbling flocks,
That wound with venom'd teeth the tender, fearful stocks.

The reason that so many complain of the improsperous condition of their wood-lands and plantations of this kind, proceeds from this ne-



The Hawthorn.

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J. Miller del. & Sculp.

glæst; though, sheep excepted, there is no employment whatsoever incident to the Farmer, which requires less expence to gratify their expectations; one diligent and skilful man will govern five hundred acres: But if through any accident a beast shall break into his master's field, or the wicked hunter makes a gap for his dogs and horses, what a clamour is there made for the disturbance of a year's crop at most in a little corn! whilst abandoning his young woods all this time, and perhaps many years, to the venomous bitings and treading of cattle, and other like injuries, for want of due care, the detriment is many times irreparable; young trees once cropped hardly ever recovering. It is the bane of all our most hopeful timber.

But shall I provoke you by an instance? A kinsman of mine has a wood of more than sixty years standing; it was, before he purchased it, exposed and abandoned to the cattle for divers years: some of the outward skirts were nothing, save shrubs and miserable starvelings; yet still the place was disposed to grow woody; but by this neglect continually suppressed. The industrious Gentleman fenced in some acres of this, and cut all close to the ground; and it is come in eight or nine years to be better worth than the wood of sixty; and will, in time, prove most incomparable timber, whilst the other part, so many years advanced, shall never recover; and all this from no other cause than preserving it fenced. Judge then by this, how our woods come to be so decried: Are five hundred sheep worthy the care of a shepherd? And are not five thousand Oaks worth the fencing, and the inspection of a hayward?

Et dubitant homines ferere, atque impendere curam? GEO. ii.

And shall men doubt to plant, and careful be?

Let us therefore shut up what we have thus laboriously planted with some good Quick-set hedge.

The Hawthorn, (*Oxyacantha vulgaris*) and indeed the very best of common hedges, is either raised of seeds or plants; but then it must not be with despair, because sometimes you do not see them peep the first year; for the Haw, and many other seeds, being invested with a very hard integument, will now and then suffer imprisonment two whole years under the earth; and our impatience at this does often frustrate the resurrection

HAWTHORN.

Book II. of divers seeds of this nature, so that we frequently dig up, and disturb the beds where they have been sown, in despair, before they have gone their full time, which is also the reason of a very popular mistake in other seeds, especially that of the Holly, concerning which there goes a tradition, that they will not sprout till they be passed thro' the maw of a Thrush; whence the saying, *Turdus exitum suum cacat* (alluding to the Viscus made thereof, not the Mistletoe of Oak); but this is an error, as I am able to testify on experience. They come up very well of the berries, treated as I have shewed in book ii. chap. vi. and with patience; for, as I affirmed, they will sleep sometimes two entire years in their graves; as will also the seeds of Yew, Sloes, Phillyrea Angustifolia, and sundry others, whose shells are very hard about the small kernels; but which is wonderfully facilitated by being, as we directed, prepared in beds, and magazines of earth, or sand, for a competent time, and then committed to the ground before the full in March, by which season they will be chitting, and speedily take root. Others bury them deep in the ground all winter, and sow them in February: And thus I have been told of a Gentleman who has considerably improved his revenue, by sowing Haws only, and raising nurseries of Quick-sets, which he sells by the hundred far and near: This is a commendable industry; any neglected corners of ground will fit this plantation: Or were such places plowed in furrow about the ground you would fence, and sowed with the mark of the cyder-prefs, crab-kernels, &c. kept secure from cattle till able to defend itself, it would yield excellent stocks to graff and transplant. And thus any larger plot, by plowing and cross-plowing the ground, and sowing it with all sorts of forest-seeds, breaking and harrowing the clods, and cleansing it from weeds with the hoe, till the plants over-top them, a very profitable grove may be raised, which will prove a magazine of singular advantage to furnish the industrious planter.

But Columella has another expedient for the raising of our Spinetum, by rubbing the now mature Hips and Haws, Ashen-keys, &c. into the crevices of bafs ropes, or wisps of straw, and then burying them in a trench; whether way you attempt it, they must (so soon as they peep, and as long as they require it) be sedulously cleansed of the weeds; which, if in beds for transplantation, had need be, at the least, three or four years; by which time even your seedlings will be of stature fit to remove: For I do by no means approve of the vulgar præmature planting of sets, as is generally used throughout England; which is to take such only as are the very

smallest; and so to crowd them into three or four files, which are both egregious mistakes.

Whereas it is found by constant experience, that plants as big as one's thumb, set in the posture, and at the distance which we spake of in the Hornbeam, that is, almost perpendicular (not altogether, because the rain should not get in betwixt the rind and wood) and single, or at most not exceeding a double row, do prosper infinitely, and much out-strip the densest and closest ranges of our trifling sets, which make but weak shoots, and whose roots do but hinder each other, and for being couched in that posture, on the sides of banks and fences, (especially where the earth is not very tenacious) are bared of the mould which should entertain them, by that time the rains and storms of one winter have passed over them. In Holland and Flanders (where they have the goodliest hedges of this kind about the counterscarps of their invincible fortifications, to the great security of their musketeers upon occasion) they plant them according to my description, and raise fences so speedily, and so impenetrable, that our best are not to enter into the comparison. Yet, that I may not be wanting to direct such as either affect the other way, or whose grounds may require some bank of earth, as ordinarily the verges of copses, and other inclosures do, you shall by line cast up your fofs of about three feet broad, and about the same depth, provided your mould hold it; beginning first to turn the turf, upon which be careful to lay some of the best earth to bed your Quick in, and there lay or set the plants, two in a foot space is sufficient; being diligent to procure such as are fresh gathered, straight, smooth, and well-rooted; adding now and then, at equal spaces of twenty or thirty feet, a young Oakling or Elm-sucker, Ash, or the like, which will come in time, especially in plain countries, to be ornamental standards, and good timber: If you will needs multiply your rows, a foot, or somewhat less, above that, upon more congested mould, plant another rank of sets, so as to point just in the middle of the vacuities of the first, which I conceive enough: This is but for the single fofs; but if you would fortify it to the purpose, do as much on the other side of the same depth, height, and planting; and then, last of all, cap the top in pyramis with the worst, or bottom of the ditch. Some, if the mould be good, plant a row or two on the edge, or very crest of the mound, which ought to be a little flattened. Here also may they set their dry hedges; for hedges must be hedged till they are able to defend and shade their under

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plantation, and I cannot reprove it: But great care is to be had in this work, that the main bank be well footed, and not made with too sudden a declivity, which is subject to fall in after frosts and wet weather, and this is good husbandry for moist grounds; but where the land lies high, and is hot and gravelly, I prefer the lower fencing; which, though even with the area itself, may be protected with stakes and a dry hedge, on the fofs-side, the distance competent, and to very good purposes of educating more frequent timber amongst the rows.

Your hedge being yet young, should be constantly weeded two or three years, especially before Midsummer, of Brambles, the great Dock, Thistle, &c. though some admit not of this work till after Michaelmas, for reasons that I approve not. It has been the practice of Herefordshire, in the plantation of Quick-set hedges, to plant a Crab-stock at every twenty feet distance; and this they observe so religiously, as if they had been under some rigorous statute requiring it: And by this means they were provided in a short time with all advantages for the grafting of fruit amongst them, which does highly recompense their industry. Some cut their sets at three years growth even to the very ground, and find that in a year or two they will have shot as much as in seven, had they been let alone.

When your hedge is now of near six years stature, plash it about February or October; but this is the work of a very dextrous and skilful husbandman; and for which our honest countryman, Mr. Markham, gives excellent directions; only I approve not so well of his deep cutting the stems, if it be possible to bend them, having suffered in something of that kind. It is almost incredible to what perfection some have laid these hedges, by the rural way of plashing, better than by clipping; yet may both be used for ornament, as where they are planted about our garden-fences, and fields near the mansion. In Scotland, by tying the young shoots with bands of hay, they make the stems grow so very close together, as that it encloseth rabbits in warrens instead of pales: and for this robust use we shall prefer the Black Thorn; the extravagant suckers which are apt to rise at distance from the hedge-line, being sedulously extirpated, that the rest may grow the stronger and thicker.

And now since I did mention it, and that most I find do greatly affect the vulgar way of Quickening, (that this our discourse be in nothing defi-

cient) we will in brief give it you again after George Markham's description, because it is the best and most accurate, although much resembling our former direction, of which it seems but a repetition, till he comes to the plashing. In ground which is more dry than wet, (for watery places it abhors) plant your Quick thus: Let the first row of sets be placed in a trench of about half a foot deep, even with the top of your ditch, in somewhat a sloping or inclining posture; then having raised your bank near a foot upon them, plant another row, so as their tops may just peep out over the middle of the spaces of your first row: These covered again to the height or thickness of the other, place a third rank opposite to the first, and then finish your bank to its intended height. The distances of the plants should not be above one foot; and the season to do the work in may be from the entry of February till the end of March, or else in September to the beginning of December. When this is finished, you must guard both the top of your bank, and outmost verge of your ditch, with a sufficient dry hedge, interwoven from stake to stake into the earth, which commonly they do on the bank, to secure your Quick from the spoil of cattle. And then being careful to repair such as decay, or do not spring, by supplying the dead and trimming the rest, you shall, after three years growth, sprinkle some timber-trees amongst them, such as Oak, Beech, Ash, Maple, Fruit, or the like; which being drawn young out of your nurseries, may be very easily inferted.

I am not in the mean time ignorant of what is said against the scattering these masts and keys among our fences; which grown, over-top the subnascent hedge, and prejudice it with their shade and drip: But this might be prevented by planting Hollies, proof against these impediments, in the line or trench where you would raise standards, as far as they usually spread in many years, and which, if placed at good distances, how close soever to the stem, would, besides their stout defence, prove a wondrous decoration to large and ample inclosures. But to resume our former work: That which we affirmed to require the greatest dexterity, is the artificial plashing of our hedge, when it is now arrived to a six or seven years head; though some stay till the tenth, or longer. In February therefore, or October, with a very sharp hand-bill, cut away all superfluous sprays and stragglers, which may hinder your progress, and are useless. Then searching out the principal stems, with a keen and light hatchet cut them slantwise close to the ground, hardly three quarters through, or rather so far

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only as till you can make them comply handsomely, which is your best direction, lest you rift the stem, and so lay it from your sloping as you go, folding in the lesser branches which spring from them; and ever within five or six feet distance, where you find an upright set (cutting off only the top to the height of your intended hedge) let it stand as a stake, to fortify your work, and to receive the twinings of those branches about it. Lastly, at the top (which should be about five feet above ground) take the longest, most slender, and flexible twigs which you reserved, and (being cut as the former, where need requires) bind in the extremities of all the rest; and thus your work is finished. This being done very close and thick, makes an impregnable hedge in few years; for it may be repeated as you see occasion; and what you so cut away will help to make your dry hedges for your young plantations, or be profitable for the oven, and make good bavin; namely, the extravagant side-branches springing the more upright, till the newly wounded are healed. There are some, yet who would have no stakes cut from the trees, save here and there one, so as to leave half the head naked, and the other standing; but the over-hanging bows will kill what is under them, and ruin the tree; so pernicious is this half-topping: Let this be a total amputation for a new and lusty spring. There is nothing more prejudicial to subnascent young trees, than, when newly trimmed and pruned, to have their (as yet raw) wounds poisoned with continual dripping, as is well observed by Mr. Nourse; but this is meant of repairing decayed hedges: For stakes in this work, Oak is to be preferred, though some will use Elder, but it is not good, or the Black Thorn and Crab tree; in moorish ground Withy, Ash, Maple, and Hazel (which last some make hedges of, but it being apt to the browsing of cattle when the young shoots appear, it does better in copses, the rest not lasting) should yet be driven well in at every yard of interval both before and after they are bound, till they have taken the hard earth, and are very fast; and even your plashed hedges need some small Thorns to be laid over, to protect the spring from cattle and sheep, till they are somewhat fortified, and the doubler the winding is lodged the better, which should be beaten, and forced down together with the stakes, as equally as may be. Note, that in sloping your windings, if it be too low done, as very usually, it frequently mortifies the tops; therefore it ought to be so bent as it may not impede the mounting of the sap. If the plash be of a great and extraordinary age, wind it at the nether boughs all together, and cutting the sets, as directed, permit it rather to hang downwards a little than rise too forwards; and then twist the branches into the work, leaving a

set free, and unconstrained at every yard space, besides such as will serve for stakes, abated to about five feet length, (which is a competent stature for an hedge) and so let it stand. One shall often find in this work, especially in old neglected hedges, some great trees or stubs that commonly make gaps for cattle; such should be cut so near the earth as till you can lay them thwart, that the top of one may rest on the root or stub of the other, as far as they extend, stopping the cavities with its boughs and branches; and thus hedges, which seem to consist but only of scrubby trees and stumps, may be reduced to a tolerable fence: but in case it be superannuated, and very old, it is advisable to stub all up, being quite renewed and well guarded. We have been the longer on these descriptions, because it is of main importance, and that so few husbandmen are so perfectly skilled in it: But he that would be more fully satisfied, I would have him consult Mr. Cook, chap. xxxii. or rather, *Instar omnium*, what I cannot without injury to the publick and ingratitude to the persons who do me the honour of imparting to me their experiences, but as freely communicate.

It is then from the Reverend Mr. Walker, of Great Billing near Northampton, that (with several other particulars relating to our rural subject) I receive from that worthy Gentleman Thomas Franklin, of Ecton, Esq; the following method of planting and fencing with Quick-sets, which we give you in his own words:

“ About ten or twelve years since I made some essays to set some little
 “ clumps of hedges and trees of about two poles in breadth, and three in
 “ length; the out-fences ditched on the outside, but the Quick-sets in the
 “ inside of the bank, that the dead hedges might stand on the outside
 “ thereof; so that a small hedge of eighteen or twenty inches high, made
 “ of small wood, the stakes not much bigger than a man’s thumb, the
 “ banks being high, sufficiently defended them for four years time, and
 “ were hedged with less than one load of shreadings of Willow-sets, which,
 “ as my workmen told me, would have required six load of copse-wood:
 “ But the next year after their being planted, finding waste ground on the
 “ top of the bank of the outer fence, between the dead hedge and the
 “ quick, I put a foot-set in the same space between the quick and the dead
 “ hedge, which prospered better than those planted in the side of the bank,
 “ after the vulgar way, and hold it still. This put me upon thinking,
 “ that a Set cheaper and better of Quick-fence might possibly be found
 “ out; and accordingly I made some trials with good success, (at least
 “ better than the old way) though not to my full satisfaction, till I had

BOOK II.

"perused Mr. Evelyn's Silva, &c. The method I used was this: First, I
 "set out the ground for ditches and quick, in breadth ten feet; then sub-
 "divided that, by marking out two feet and a half on each side (more or
 "less, at pleasure) for the ditches, leaving five in the middle between
 "them: Then digging up two feet in the midst of that five feet, plant
 "the sets in; though it require more labour and charge, I found it soon
 "repaid the cost. This done, I began to dig the fosses, and to set up one
 "row of turfs on the outside of the said five feet; namely, one row on
 "each side thereof, the green side outmost, a little reclining, so as the
 "grass might grow: After this, returning to the place begun at, I ordered
 "one of the men to dig a spit of the under turf-mould, and lay it be-
 "tween the turfs, placed edge-wise, as before described, upon the two feet
 "which was purposely dug in the middle, and prepared for the sets, which
 "the planter sets with two Quicks upon the surface of the earth, almost
 "upright, whilst another workman lays the mould forward about twelve
 "inches, and then sets two more, and so continues. Some there are who
 "plant three rows of sets about eight inches interval; but I do not approve
 "it, for they choak one another. This finished, I order another row of
 "turfs to be placed on each side upon the top of the former, and fill the
 "vacuity between the sets and the turfs, as high as their tops, always lea-
 "ving the middle, where the sets are planted, hollow, and somewhat lower
 "than the sides of the banks by eight or ten inches, that the rain may
 "descend to their roots, which is of great advantage to their growth, and
 "far better than by the old way; where the banks run too much sloping,
 "the roots of the sets are seldom wetted in an ordinary season, the summer
 "following; but which if it prove dry, many of the sets perish, especi-
 "ally the late planted: Whereas those which I planted in the latter end of
 "April, though the summer happened to be somewhat dry, generally
 "escaped, very few of them miscarrying. Now the planting thus advan-
 "ced, the next care is fencing, which is performed by setting an hedge of
 "about twenty inches high upon the top of the bank, on each side thereof,
 "leaning a little outward from the sets, which will protect them as well,
 "if not better, than an hedge of three feet, or four inches more, standing
 "upon the surface of the ground, which being raised with the turfs and
 "sods about twenty inches, and the hedge about twenty inches more, will
 "make three feet four inches, so as no cattle can approach the dead hedge
 "to prejudice it, unless they set their feet in the ditch itself; which will
 "be at least a foot deep, and from the bottom of the foss to the top of
 "the hedge, about four feet and a half, which they can hardly reach over

“to crop the Quick, as they might in the old way; and besides, such an
 “hedge will endure a year longer. I have at this present time an hedge
 “which has stood these five years; and tho’ nine or ten feet be sufficient
 “for both ditches and bank, yet where the ground is but indifferent, it is
 “better husbandry to take twelve feet, which will allow of a bank at least
 “six feet broad, and gives more scope to place the dead hedges farther
 “from the sets, and the ditches being shallow, will, in two years time,
 “graze; though I confine myself for the most part to nine or ten, because
 “I would take off the only objection of wasting ground by this way,
 “should others follow it. In reply to this, I affirm, That if you take
 “twelve feet in breadth, for ditch and bank, you waste more ground than
 “by the common way: For in that a Quick is rarely set, but there is
 “nine feet between the dead hedges, which is entirely lost all the time of
 “fencing: When as with double ditches, there remains at least eighteen
 “inches on each side where the turfs were set on edge, that bear more
 “grass than when it lay on the flat. But admitting it did totally lay waste
 “three feet of ground, the damage were very inconsiderable, since forty
 “perches, in length two hundred and twenty yards, which make perches
 “7, 25”, 9’, or 7 poles $\frac{1}{2}$, at thirteen shillings and fourpence the acre,
 “amounts not to 7d. $\frac{1}{2}$ *per Ann.* Now that this is not only the best but
 “cheapest way of Quick-setting, will appear by comparing the charge
 “of both: In the usual way, the charge of a three feet ditch is fourpence
 “per pole, the owner providing sets; if the workman finds them, he will
 “have for making the said ditch, and setting them, eightpence the pole,
 “and for hedging twopence; that is, for both sides fourpence the pole,
 “which renders the charge of hedging, ditching, and sets, twelvapence
 “the pole; that is, for forty rods in length, forty shillings: then one
 “load of wood out of the copse costs us, with the carriage, (though but
 “two or three miles distance) ten shillings, which will seldom hedge above
 “eight poles (single hedge). But allowing it to do ten, to fence forty
 “poles there must be at least eight load of wood, which costs four pounds,
 “making the whole expence for ditching, setting, and fencing of forty
 “poles to be six pounds, reckoning with the least; for I know not any
 “that will undertake to do it under three shillings and sixpence per pole,
 “and then the forty poles cost seven pounds. Whereas, with double
 “ditches, both of them, setting and sets, will be done for eightpence per
 “pole, and the husbandman get as good wages as with a single ditch, (for
 “tho’ the labour about them is more, yet the making the table is saved)
 “which costs one pound six shillings and eightpence. And the hedges be-

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“ing but low, they will make better wages at hedging for a penny the pole, than at twopence for common hedges, which comes to fix shillings and eightpence for hedging forty poles on both sides: Thus one load of wood will fence thirty poles at least, and forty hedged with two thirds of wood less than in the other way, and cost but one pound six shillings and eightpence, which makes the whole charge of sets, ditching, fencing, and wood, but three pounds.”

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Hitherto this obliging and industrious Gentleman.

To other uses: The root of an old Thorn is excellent both for boxes and combs, and is curiously and naturally wrought: I have read that they made ribs to some small boats or vessels with the White Thorn; and it is certain, that if they were planted single, and in standards, where they might be safe, they would rise into large bodied trees in time, and be of excellent use for the Turner, not inferior to Box. It was accounted among the fortunate trees, and therefore used in *Fases Nuptiarum*, since the jolly shepherds carried the White Thorn at the Rapine of the Sabines.

The distilled water, or stone and kernel of the Haw reduced to powder, is generally agreed to be sovereign against the stone. The Black Crab, rightly seasoned and treated, is famous for walking-staves; and if overgrown, is used in mill-work; yea, and for rafters of great ships. Here we owe due Eulogy to the industry of the late Lord Shaftesbury, who has taught us to make such inclosures of Crab-stocks only, planted close to one another, as there is nothing more impregnable and becoming; or you may sow Cyder-kernels in a rill, and fence it for a while with a double dry hedge, not only for a sudden and beautiful, but a very profitable inclosure; because, amongst other benefits, they will yield you Cyder-fruit in abundance. But in Devonshire they build two walls with their stones, setting them edge-ways, two, and then one between; and so as it rises, fill the interval, or cofer, with earth, (the breadth and height as you please) continuing the stone-work, and filling; and, as you work, beating in the stones flat to the sides, they are made to stick everlastingly. This is

absolutely the neatest, most saving, and profitable fencing imaginable, where flat stones are in any abundance; and it becomes not only the most secure to the lands, but the best for cattle, to lie warm under the walls; whilst other hedges, be they ever so thick, admit of some cold winds in winter-time when the leaves are off. Upon these banks they plant not only Quick-fets, but even Timber-trees, which exceedingly thrive, being out of all danger.

The Pyracantha, Paliurus, and like precioufer sorts of Thorn and robust Evergreens adorned with Caralin Berries, might easily be propagated by seeds, layers, or cuttings, into plenty sufficient to store even these vulgar uses, were men industrious; and then, how beautiful and sweet would the environs of our fields be! for there are none of the spinous shrubs more hardy, none that make a more glorious shew, nor fitter for our defence, competently armed, especially the Rhamnus, which I therefore join to the Oxyacantha, for its terrible and almost irresistible spines, able almost to pierce a coat of mail; and for this made use of by the malicious Jews, to crown the sacred temples of our Blessed Saviour, and is yet preferred among the most venerable relicks in St. Chapel at Paris, as is pretended by the Devotees, &c. and hence has the tree (for it sometimes exceeds a shrub) the name of *Christ's Thorn*. Thus might Barberries now and then be also inserted among our hedges, which, with the Hips, Haws, and Cornel Berries, do well in light lands, and should rather be planted to the south than north or west, as usually we observe them.

PYRACANTHA

Some, as we noted, mingle their very hedges with Oaklings, Ash, and Fruit-trees, sown or planted, and it is a laudable improvement; though others do rather recommend to us fets of all one sort, and will not so much as admit of the Black Thorn to be mingled with the White, because of their unequal progress; and indeed, Timber-trees set in the hedge (though contemporaries with it) do frequently wear it out: And therefore I should rather encourage such plantations to be at some yards distance, near the verges, than perpendicularly in them. Lastly, if in planting any the most robust forest-trees (especially Oak, Elm, Chestnut) at competent spaces, and in rows, you open a ring of ground, at about four feet distance from the stem, and prick in Quick-set plants, you may after a while keep them clipped, at what height you please: They will appear exceedingly beautiful to the eye, prove a good fence, and yield useful bush, bavin,

F f f

BOOK II. and (if you maintain them unshorn) Hips and Haws in abundance; this should therefore especially be practised, where one would invite the birds.

In Cornwall they secure their lands and woods with high mounds, and on them they plant acorns, whose roots bind in the looser mould, and so form a double and most durable fence, incircling the fields with a coronet of trees. They do likewise, and that with great commendation, make hedges of our Genista Spinosa, prickly Furze, of which they have a taller sort, such as the French employ for the same purpose in Bretaign, where they are incomparable husbands.

FURZE.

Furze is to be sown (which is best) or planted of the roots in a furrow: If sown, weed till it be strong; both tonsile, and to be diligently clipped, which will render it a very thick, excellent, and beautiful hedge; otherwise, permitted to grow at large, it will yield very good faggot: It is likewise admirable covert for wild fowl, and will be made to grow even in moist as well as dry places. The young and tender tops of Furzes, being a little bruised, and given to a lean sickly horse, will strangely recover and plump him. Thus, in some places, they sow in barren grounds, when they lay them down, the last crop with this seed, and so let them remain till they break them up again, and, during that interim, reap considerable advantage: Would you believe (writes a worthy correspondent of mine) that in Herefordshire, famous for plenty of wood, their thickets of Furzes, viz. the Vulgar, should yield them more profit than a like quantity of the best wheat-land of England? for such is theirs. If this be questioned, the scene is within a mile of Hereford, and proved by anniversary experience, in the lands, as I take it, of a Gentleman who is now one of the burgessees for that city. And in Devonshire (the seat of the best husbands in the world) they sow on their worst land, well plowed, the seeds of the rankest Furzes, which, in four or five years, becomes a rich wood: No provender, as we say, makes horses so hardy as the young tops of these Furzes; no other wood so thick, nor more excellent fuel; and for some purposes also, yielding them a kind of timber to their more humble buildings, and a great refuge for fowl and other game. I am assured in Bretaign it is sometimes sown no less than twelve yards thick, for a speedy, profitable, and impenetrable mound: If we imitated this husbandry in the dry and hot barren places of Surry, and other parts of this nation, we might exceedingly spare our woods. I have bought the best sort of French seed at the Shops in London. It seems that in the more eastern parts of Ger-

many, and especially in Poland, this vulgar trifle, and even our common Broom is so rare, that they have desired the seeds of them out of England, and preserve them with extraordinary care in their best gardens. This I learn out of our Johnson's Herbal; by which we may consider, that what is reputed a curse, and a lumber in some places, is esteemed the ornament and blessing of another: but we shall not need go so far for this, since both Beech and Birch are almost as great strangers in many parts of this nation, particularly Northampton and Oxfordshire. Mr. Cook is much in praise of Juniper for hedges, especially for the more elegant inclosures, and we daily see how it is improved of late.

Genista Scoparia. Broom. This is another improvement for barren grounds, and savor of more substantial fuel: It may be sown English, or (what is more sweet and beautiful) the Spanish with equal success. In the western parts of France, and with us in Cornwall, it grows to an incredible height, (however our Poet gives it the epithet of *Humilis*) and so it seems they had it of old, as appears by Gratius's *Genistæ Altinates*, with which, as he affirms, they used to make staves for their spears and hunting darts. The seeds of Broom vomit and purge, whilst the buds and flowers, being pickled, are very grateful.

BROOM.

Sambucus. The Elder. This makes a considerable fence if set of reasonable lusty truncheons, much like the Willow, and, as I have seen them maintained, laid with great curiosity; these far excel those extravagant plantations of them about London, where the lops are permitted to grow without due and skilful laying. There is a sort of Elder which has hardly any pith; this makes exceeding stout fences, and the timber very useful for cogs of mills, butchers' skewers, and such tough employments. Old trees do in time become firm, and close up the hollowness to an almost invisible pith. But if the medicinal properties of the leaves, bark, berries, &c. were thoroughly known, I cannot tell what our countryman could ail, for which he might not fetch a remedy from every hedge, either for sickness or wound: The inner bark of Elder, applied to any burning, takes out the fire immediately; that, or in season the buds, boiled in water-grewel for a breakfast, has effected wonders in a fever; and the decoction is admirable to assuage inflammations and tetrous humours, and especially the scorbute: But an extract, or theriaca, may be composed of the berries, which is not only efficacious to eradicate this epidemical incom-

ELDER.

BOOK II.

venience, and greatly to assist longevity, (so famous in the story of Nearer) but is a kind of catholicon against all infirmities whatever: and of the same berries is made an incomparable spirit, which drunk by itself, or mingled with wine, is not only an excellent drink, but admirable in the dropsy. In a word, the water of the leaves and berries is approved in the dropsy, every part of the tree being useful, as may be seen at large in Blockwitzius's Anatomy thereof. The ointment made with the young buds and leaves in May with butter, is most sovereign for aches, shrunk sinews, hæmorrhoids, &c. and the flowers macerated in vinegar, not only are of a grateful relish, but good to attenuate and cut raw and gross humours. Lastly, the fungus (which we call Jews-Ears) decocted in milk, or macerated in vinegar, is of known effect in the angina and sores of the throat. And less than this could I not say (with the leave of the charitable Physician) to gratify our poor wood-man; and yet when I have said all this, I do by no means commend the scent of it, which is very noxious to the air; and therefore, though I do not undertake that all things which sweeten the air are salubrious, nor all ill flavours pernicious, yet, as not for its beauty, so neither for its smell, would I plant Elder near my habitation; since we learn from Biesius *, that a certain house in Spain, seated amongst many Elder trees, diseased and killed almost all the inhabitants, which when at last they were grubbed up, became a very wholesome and healthy place. The Elder does likewise produce a certain green fly, almost invisible, which is exceedingly troublesome, and gathers a fiery redness where it attacks.

* De Aeris
potestate.

SPINDLE-
TREE.

Euonymus. Spindle-tree. This is a shrub which commonly grows in our hedges, and bears a very hard wood, of which they sometimes make bows for viols, and the Inlayer uses it for its colour, and Instrument-makers for toothing of organs and virginal-keys, tooth-pickers, &c. What we else do with it I know not, save that (according to its name, abroad) they make spindles with it. I also learn, that three or four of the berries purge both by vomit and siege, and the powder, made of the berry, being baked, kills nits, and cures scurfy heads. Matthiolus says the poor people about Trent press oil out of the berries, wherewith to feed their lamps: But why they were wont to scourge parricides with rods made of this shrub, before they put them into the sack, see Modestinus, L. penult SS. ad Legem Pomp. de Parricid. cited by Mr. Ray. Here might come in, or be named at least, Wild Cornel, or Dog-wood, good to make mill-cogs, pebbles, bobins for bone-lace, spokes for wheels, &c. also the best

DOGWOOD.

skewers for butchers, because it does not taint the flesh, and is of so very hard a substance as to make wedges to cleave and rive other wood with instead of iron. The Viburnum, or Way-faring tree, growing plentifully in every corner, makes pins for the yokes of oxen; and superstitious people think that it protects their cattle from being bewitched, and plant the shrub about their stalls: It is certainly the most pliant and best bands to faggot with. The leaves and berries are astringent, and make an excellent gargle for loose teeth, sore throats, and stop fluxes. The leaves decocted to a lye, not only colour the hairs black, but fasten their roots; and the bark of the root, macerated under ground, well beaten, and often boiled, serves for bird-lime.

VIBURNUM.

The American Yucca is a hardier plant than we take it to be; for it will suffer our sharpest winter, as I have seen by experience, without that trouble and care of setting it in cases in our Conservatories of hyemation; such as have beheld it in flower (which is not indeed till it be of some age) must needs admire the beauty of it; and it being easily multiplied, why should it not make one of the best and most ornamental fences in the world for our gardens, with its natural palisadoes, as well as the more tender and impatient of moisture, the Aloe, does for their vineyards in Languedoc? But we believe nothing improvable, save what our grandfathers taught us. Finally, let trial likewise be made of that Thorn, mentioned by Capt. Liggon in his History of Barbadoes, whether it would not be made grow amongst us, and prove as convenient for fences as there, the seeds or sets being transported to us with due care. And thus, having accomplished what, by your commands, I had to offer concerning the propagation of the more solid, material, and useful trees, as well the dry as aquatical, and to the best of my talent fenced our plantation in, I should here conclude, and set a bound likewise to my discourse, by making an apology for the many errors and impertinencies of it, did not the zeal and ambition of this illustrious Society to promote and improve all attempts which may concern publick utility or ornament, persuade me, that what I am adding for the farther encouragement to the planting of some other useful (though less vulgar) trees, will at least obtain your pardon, if it miss of your approbation*.

YUCCA.

NOTES.

* This Discourse on Forest-Trees was undertaken at the request of the Royal Society in the year 1664, and greatly contributed to the reputation of that learned body.

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FRUIT-
TREES.

To discourse in this style of all such Fruit-trees as would prove of greatest emolument to the whole nation, were to design a just volume; and there are directions already so many, and so accurately delivered and published, (but which cannot be affirmed of any of the former classes of forest-trees, and other remarks, at the least to my poor knowledge and research) that it would be needless to repeat.

I do only wish (upon the prospect and meditation of the universal benefit) that every person whatever, worth ten pounds *per Annum*, within her Majesty's dominions, were, by some indispensable statute, obliged to plant his hedge-rows with the best and most useful kinds of them, especially in such places of the nation, as being the more inland counties, and remote from the seas and navigable rivers, might the better be excused from the planting of timber, to the proportion of those who are more happily and commodiously situated for the transportation of it.

Undoubtedly, if this course were taken effectually, a very considerable part both of the meat and drink, which is spent to our prejudice, might be saved by the country people, even out of the hedges and mounds, which would afford them not only the pleasure and profit of their delicious fruit, but such abundance of cyder and perry, as should suffice them to drink of one of the most wholesome and excellent beverages in the world.

Old Gerard did long since alledge us an example worthy to be pursued: "I have seen, saith he, (speaking of Apple trees, lib. iii. cap. ci.) in the pastures and hedge-rows about the grounds of a worshipful Gentleman, dwelling two miles from Hereford, called Mr. Roger Bodnome, so many trees of all sorts, that the servants drink for the most part no other drink but that which is made of apples: The quantity is such, that by the report of the Gentleman himself, the Parson hath for tithe many hog-heads of cyder; the hogs are fed with the fallings of them, which are so many, that they make choice of those apples they do eat, and will not taste of any but of the best. An example doubtless to be followed of Gentlemen that have land and living: But *Envy* saith, the poor will break down our hedges, and we shall have the least part of the fruit. But foreward, in the name of God, graff, set, plant, and nourish up trees in every corner of your ground; the labour is small, the cost is nothing, the commodity is great; yourselves shall have plenty, the poor shall have somewhat in time of want to relieve their necessity, and God

“shall reward your good minds and diligence.”—Thus far honest Gerard. And in truth, with how small a charge and infinite pleasure this were to be effected, every one that is patron of a little nursery can easily calculate: For by this expedient many thousands of acres, sowed now yearly with barley, might be cultivated for wheat, or converted into pasture, to the increase of corn and cattle. Besides, the timber which the Pear tree, Black Cherry, and many thorny Plums (which are best for grain, colour, and gloss) afford, comparable, for divers curious uses, with any we have enumerated. The Black Cherry Wood grows sometimes to that bulk as is fit to make stools with, cabinets, tables, especially the redder sort, which will polish well, also pipes and musical instruments; the very bark is employed for bee-hives. I would farther recommend the more frequent planting and propagation of Fir, Pine trees, and some other beneficial materials, both for ornament and profit; especially since we find by experience they thrive so well where they are cultivated for curiosity only.

I have now finished my planting. A word or two concerning the preservation of the trees, and the cure of their infirmities, expect in the next chapter.

C H A P. VIII.

*Of the INFIRMITIES of TREES, &c. **

BOOK II.

SO many are the infirmities and sicknesses of trees, and indeed infirmities of the whole family of vegetables, that it were almost impossible to enumerate and make a just catalogue of them, and as difficult to find such infallible cures and remedies as could be desired, the effects arising from so many, and such different causes. Whenever, therefore, our trees and plants fail and come short of the fruit and productions we expect of them, (if the fault be not in our want of care) it is certainly to be attributed to those infirmities to which all elementary things are obnoxious, either from the nature of the things themselves, and in themselves, or from some outward injury, not only through their being unskilfully cultivated by men, and exposed to hurtful beasts, but subject to be preyed upon and ruined by the most minute and despicable insects, besides other casualties and accidents innumerable, according to the rustick rhyme:

The Calf, the Wind-shock, and the Knot,

The Canker, Scab, Scurf, Sap, and Rot,

affecting the several parts. These invade the roots; stony and rocky grounds, Ivy, and all climbers, weeds, suckers, fern, wet, mice, moles, winds, &c.

N O T E S.

* Vegetables cannot be supposed to be subject to infirmities, unless we allow them to be organized bodies, and endued with life. That they have life, may be proved from the following considerations: 1. Their Motion; 2. Anatomy; 3. Generation; 4. Age; 5. Diseases; 6. Death.

1. MOTION. It is evident that a dead body has no motion of its own; if therefore any body has spontaneous motion, it must also have life: For proper and internal motion in every body depends on the spontaneous propulsion of fluids, and where such a propulsion of fluids is, there is life. That there is motion in plants is apparent to every one; *e. g.* herbs in green-houses or stoves incline or turn towards the light. When shut up, if they find a hole in the wall, shutters, or frames, there they endeavour to penetrate. Several plants, especially those with compound yellow flowers, during the whole day turn their flowers towards the sun; to wit, to the east in the morning, to the south at noon, and to the west toward evening; and this is observable in the *Sonchus Arvensis*, Tree Sow-Thistle. I believe every body knows, that the greatest number of plants in a serene sky expand their flowers, and, as it were, with cheerful looks behold the light of the sun; but before rain they shut them up; *e. g.* the Tulip. The flowers of the *Draba Alpina*, Alpine Whitlow Grass, the *Parthenium*

To these may be added siderations, pestiferous air, fogs, excessive heat, sulphurous and arsenic smoak and vapours, and other plagues, tumours, distortions, lacrymations, tophi, gouts, carbuncles, ulcers, crudities, fungosities, gangrenes, and an army more, wherof some are hardly discernable, yet enemies, which not foreseen, makes many a bargain of standing wood, though seemingly fair, very costly ware: In a word, whatsoever is exitial to men is so to trees; for the averfion of which they had, of old, recourse to the Robigalia and other Gentile ceremonies: but no longer abused by

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foliis ovatis crenatis, Bastard Feverfew with egg-shaped crenated leaves, and the *Tridentalis*, or Winter-green, hang down in the night, as if the plants were asleep, lest rain or the moist air should injure the fertilizing dust. The Trefoils, and one species of Wood-sorrel, shut up or double their leaves before storms and tempests, but in a serene sky expand or unfold them, so that from them the husbandman can pretty clearly foretell an approaching storm. And it is well known that the *Bauhinia*, or Mountain Ebony, Sensitive Plants, and *Cassia*, observe the same rule. The flowers of Goat's Beard open in the morning at the approach of the sun, and shut about noon; hence it is called John-go-to-bed-at-noon. *Parkinsonia*, Tamarind tree, *Æschynomene*, or Bastard Sensitive Plant, and several others of the *Diadelphia* class, in serene weather expand their leaves in the day-time, and contract them in the night. The Tamarind tree is said, by Alpinus and Acolta, to enfold within its leaves the flowers or fruit every night, to guard them from cold or rain. This seemed like a paradox to Syenus and Ray: but the flower-stalk with the flower or fruit lies upon the winged leaves from the bosom of which it springs; hence it is, that while the leaves fold themselves up every night, they shut up or enclose the fructification within them. Some of the *Mimosæ*, or Sensitive Plants, and the *Oxalis*, or Wood-sorrel with pinnated leaves, upon being touched roll up their leaves, and turn downwards or shrink, and after a little space extend them again, as if they had both life and sensation. As it cannot be denied, but that man, or any other animal, destitute of motion, grows pale and weak; so, on the other hand, it is a certain truth, that motion or exercise renders them florid, stout, fat, and healthy; since exercise enlarges the limbs, as Avicenna rightly observes. Hence the rustic excels the courtier in strength of body and largeness of limbs, being used to much walking, and other exercise; and it is well known that the right hand of mechanics, and other people inured to labour, is for the most part bigger than the left. These obvious truths need no laboured demonstration. With plants it is the same. These in stoves and green-houses, tho' they have sufficient heat and nourishment, are slender, weak, and lose the colour of their leaves, and seem to languish for want of motion: and trees, surrounded with high walls or buildings, and confined within narrow bounds, are slender, and grow tall, but not strong. Pines in very thick woods, where the high winds have not free access to shake them, grow tall and slender; while others planted in open fields, and frequently shaken by stormy winds, have not only

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charmings and superstitious fopperies, we have, in this chapter, endeavoured to set down and prescribe the best and most approved remedies hitherto found out, as well natural as artificial.

And *first*, Weeds are to be diligently pulled up by hand after rain, whilst your seedlings are very young, and till they come to be able to kill them with shade and over-dripping; and then are you, for the obstinate, to use the hoe, fork, and spade to extirpate Dog-grafs, Bear-bind, &c.

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thick and strong stems, but also strike deep root, and raise beautiful and spreading branches.

2. ANATOMY. Malpighi and Grew, unknown to each other, undertook the anatomy of plants nearly about the same time. Many things, however, have been found out since their days—and many things remain yet to be discovered.

The general and obvious parts of a plant are five. The root; the stem; the branches; the leaves; the flower. The component parts of these divisions are simple in comparison to the animal body. The offices of a vegetable being only increase and fructification, there was no necessity for a complicated structure.—A good microscope discovers the constituent parts of a plant to be, 1. A very thin outer rind. 2. An inner rind, much thicker than the former. 3. A blea, of a spongy texture. 4. A vascular series. 5. A fleshy substance, which answers to the wood of a tree, or shrub. 6. Pyramidal vessels contained within the flesh. And, 7. A pith.—Whatever part of the plant we examine, we observe these, and no more. The root, its ascending stalk, and descending fibre, are one, and not three substances. This reduces the entire vegetable to one body; and what appears in the flower to be many parts, are only the extremities of the seven above-mentioned. The cup terminates the outer bark. The inner rind ends in the outer petals. The blea forms the inner petals. The vascular series ends in the nectaria. The flesh makes the filaments. The pyramidal vessels form the receptacle. The pith furnishes the seeds and their capsules.—Words not being able to convey an adequate idea of these parts, I must beg leave to refer the reader to the excellent engravings of Dr. Hill, as published in his Vegetable System.—As I apprehend that his researches into the vegetable creation are more minute than those of his predecessors, I have followed him in the enumeration of the constituent parts of a plant. He has justly recommended the Black Hellebore as the properest subject for dissection. It is a perennial plant of a firm texture, and not too complex, consisting only of a root, radical leaves, and a flower stem.

A careful maceration of the parts, a good microscope, and a most delicate touch, are essentially necessary towards investigating the structure of vegetable bodies.—Trees, shrubs, and herbs are organized in the same manner; but the colour and thickness of their component parts are different, according to their respective natures.

The outer bark is the first thing that presents itself to our view. It has the appearance of a fine film full of irregular meshes, though in reality it consists of two mem-

And here, mentioning shade and dripping, though I cannot properly speak of them as infirmities of trees, they are certainly the causes of their unthriving till removed; such as that of the Oak and Mast-holme, Walnut, Pine, Fir, &c. the thickness of the leaves intercepting the sun and rain; whilst that of other trees is good, as the Elm, and several others.

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branes, with a series of vessels between them. These take their course upwards, and as they advance towards the cup of the flower, inosculate with the small vessels of the inner bark, into which they pour part of the juices they have received from the earth and the atmosphere. The fine meshes serve the purposes of inhalent or exhalent pores, according to the circumstances of the weather.—The inner bark is much thicker than the outer. It is made up of several flakes laid evenly upon one another, each of which consists of two membranes inclosing a series of vessels. These communicate freely through the whole substance of the rind, and as they inosculate with the vessels of the outer bark, so they also communicate with those of the blea.—The blea lies immediately under the inner bark. It is one compleat and single substance, uniform in its structure. It is of a considerable thickness, and is made up of beds of hexagonal cells. In the angles formed by these cells, we observe the vessels of the blea. They pour their contents into the cells, which appear to be reservoirs for the water imbibed by the plant.—Underneath the blea, lies the fourth substance called the Vascular Series. Its structure is extremely simple, being a single course of greenish vessels lodged between two membranes. It terminates in the nectaria. At a certain season of the year, the juices of the vascular series are very mucilaginous. They are particularly so in the Holly, and seem to be more elaborated than those of the blea. Its vessels have a free communication with the wood and blea.—The favourers of a circulation assert that, through these vessels, the returning sap descends; but by the most accurate experiments of Dr. Hales, it appears that the vegetable juices do rise and fall in the same series of vessels, and consequently have no circulation.

The wood, or fleshy part of a plant, comes next to be examined. In this the life of the vegetable seems to be placed. It is universal in the plant, and is made up of strong fibres. From it all the other parts are produced. It shoots a pith inward, and a rind, blea, and vascular series outward. The filaments in the flower, which are essential parts in the production of new plants, are continuations of it. And as the seed-vessels are portions of the pith, so are the petals and nectaria continuations of the rind, blea, and vascular series; all which the plant shoots outward. Through every part of the wood, or flesh, there are vessels that carry a juice highly elaborated, the greatest part of which has undergone the concoction of the rinds, blea, and vascular series. The woody fibres constitute an order of vessels, which are named Tracheæ. These are filled with elastic air, and may be discovered, by the eye, in the wood of all trees. The Tracheæ make up an arterial system, and supply the place of the heart in animals. Being filled with air, they become subject to the alternacies of heat and cold. Their use shall be explained hereafter.—The pyramidal vessels are

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Secondly, Suckers shall be duly eradicated, and with a sharp spade dexterously separated from the mother-roots, and transplanted in convenient places for propagation, as the season requires.

Here note, That fruit grafted upon suckers are more disposed to produce suckers, than such as are propagated upon good stocks.

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spread through all the substance of the flesh, and, as they advance upwards, their ramifications inosculate, so as to prevent any possible obstruction of the sap. Their juices, as I have observed, are highly elaborated, having passed through all the orders of sap-vessels. It will here be necessary to remark, that the sides of these vessels are constantly in contact with the Tracheæ; so that, from the nature of their situation, they must, at all times, be subject to the vicissitudes of the weather. The pyramidal vessels communicate with the pith, which remains to be described.—The pith is to be found in all trees, shrubs, and plants. It occupies the centre, but is not always regularly continued. When examined by a microscope, it has the appearance of a number of vesicles, and is of an uniform structure. It does not appear to be absolutely necessary to vegetation, as we often observe Elms, and other trees, to live and thrive without it. In trees, it is found in the branches, being obliterated in the trunk. The vessels of the flesh communicate with it. From them it receives a fluid; and probably it is the receptacle of some part of the sap. In extreme dry weather such a store may be necessary.—Transverse sections of the ribs of leaves discover it. When minutely traced, it is found to run up to the ovary, where it forms the seeds and their capsules.—From this survey of the anatomy of a plant, it is evident that there is a correspondence between all its parts. By means of a variety of strainers, different juices are prepared from the same mass. Matter, considered as matter, has no share in the qualities of bodies. It is from the arrangement of it that we have so many different substances in nature. We may eat the earth, and we may drink the water that moistens it, and yet, from the modification of its parts, it is capable of producing both bread and poison.—We reason improperly, when we say that every plant takes from the earth such particles as are natural to it. A Lemon ingrafted upon an Orange stock, is capable of changing the sap of the Orange into its own nature, by a different arrangement of the nutritive juices. A mass of innocent earth can give life and vigour to the bitter Aloe, and to the sweet Cane; to the cool House-leek, and to the fiery Mustard; to the nourishing Grains, and to the deadly Nightshade.—The fibres of a root are supposed to be simple capillary tubes; but, upon a minute inspection, we discover them to consist of the seven component parts of the plant. At their extremities we observe a spongy kind of excrescence pierced with innumerable small holes. Through these the nutritive juices of the earth are absorbed. When a plant has been pulled up, it will be retarded in its growth, until nature has renewed that spongy nipple.—The bark and leaves of a plant imbibe, at proper seasons, the moisture of the atmosphere. At other times they perspire the superfluous nourishment. This opens to our view an extensive prospect of the vegetable œcono-

Thirdly, Fern is best destroyed by striking off the tops, as Tarquin did the heads of the Poppies: This done with a good wand or cudgel, at the decrease in the spring, and now and then in summer, kills it, as also it does Nettles in a year or two, (but most infallibly by being eaten down, at its spring, by Scotch sheep) beyond the vulgar way of mowing or burning, which rather increases than diminishes it.

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my.—We have already seen that all the parts of a plant are the same. They only differ in shape. The roots are formed sharp and pointed, to make their passage easier thro' the earth. The leaves are made broad to catch the moisture of the air with more readiness. When the root of a tree happens to be elevated, instead of being retained within the earth, it assumes the appearance of a perfect plant, with leaves and branches. Experiments shew us that a young tree may have its branches placed in the earth, and its roots elevated in the air; and in that inverted state it will continue to live and grow.—The air contains, especially during the summer months, all the principles of vegetation: Oil for the perfect food, water to dilute it, and salts to assimilate it. These are greedily absorbed by the vessels of the leaves and bark, and conveyed to the innermost parts of the plant for its growth and fructification. When the air happens to be cold and moist, this absorption takes place. When it is hot and dry, the same vessels throw off the superfluous moisture by perspiration. In animals, the kidneys and pores of the skin carry off the superfluity. The vegetable not having kidneys, perspires more than the animal. Dr. Hales has demonstrated that this perspiration is considerable. I shall here transcribe his statical experiments upon the Sun-flower, for the benefit of those who may not have an opportunity of examining the original.

“ July 3, 1724, in order to find out the quantity imbibed and perspired by the “ Sun-flower, I took a garden-pot (Plate 1. Fig. 5.) with a large Sun-flower, *a*, “ 3 feet $+ \frac{1}{2}$ high, which was purposely planted in it when young: It was of the large “ annual kind.—I covered the pot with a plate of thin milled lead, and cemented all “ the joints fast, so as no vapour could pass, but only air, thro' a small glass tube, *b*, “ nine inches long, which was fixed purposely near the stem of the plant, to make “ a free communication with the outward air, and that under the leaden plate.—I “ cemented also another short glass tube, *c*, into the plate, two inches long, and one “ inch in diameter. Through this tube I watered the plant, and then stopped up “ all the holes, *d*, *e*, at the bottom of the pot with corks.—I weighed this plant and “ pot morning and evening, for fifteen several days, from July 3, to August 8, after “ which I cut off the plant close to the leaden plate, and then covered the stump “ well with cement; and upon weighing found there perspired through the unglazed “ porous pot two ounces every twelve hours day; which being allowed in the daily “ weighing of the plant and pot, I found the greatest perspiration of twelve hours in “ a very warm dry day to be one pound fourteen ounces; the middle rate of perspira- “ tion, one pound four ounces. The perspiration of a dry warm night, without any “ sensible dew, was about three ounces; but when any sensible, though small dew,

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Fourthly, Over much wet is to be drained by trenches, where it infects the roots of such kinds as require drier ground: but if a drip do fret into the body of a tree by the head, which will certainly decay it, cutting first the place smooth, stop and cover it with loam and hay, or a Cerecloth, till

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“ then the perspiration was nothing; and when a large dew, or some little rain in the
 “ night, the plant and pot was increased in weight two or three ounces. [I used
 “ avoirdupois weights.] I cut off all the leaves of this plant, and laid them in five
 “ several parcels, according to their several sizes, and then measured the surface of a
 “ leaf of each parcel, by laying over it a large lattice made with threads, in which
 “ the little squares were a quarter of an inch each; by numbering of which I had
 “ the surface of the leaves in square inches, which, multiplied by the number of the
 “ leaves in the corresponding parcels, gave me the area of all the leaves; by which
 “ means I found the surface of the whole plant, above ground, to be equal to 5616
 “ square inches, or 39 square feet.—I dug up another Sun-flower, nearly of the
 “ same size, which had eight main roots, reaching fifteen inches deep and sideways
 “ from the stem: It had besides a very thick bush of lateral roots from the eight
 “ main roots, which extended every way in a hemisphere, about nine inches from the
 “ stem and main roots.—In order to get an estimate of the length of all the roots, I
 “ took one of the main roots with its laterals, and measured and weighed them;
 “ and then weighed the other seven roots, with their laterals; by which means, I
 “ found the sum of the length of all the roots to be no less than 1448 feet.—And
 “ supposing the periphery of these roots, at a medium, to be 0.131 of an inch, then
 “ their surface will be 2276 square inches, or 15.8 square feet; that is equal to 0.4 of
 “ surface of the plant above ground.—If, as above, twenty ounces of water, at a me-
 “ dium, perspired in twelve hours day, (i. e.) thirty-four cubick inches of water,
 “ (a cubick inch of water weighing 254 grains) then the thirty-four cubick inches di-
 “ vided by the surface of all the roots, is=2286 square inches (i. e.) $\frac{34}{2286}$ is $\frac{1}{67}$; this
 “ gives the depth of water imbibed by the whole surface of the roots, viz. $\frac{1}{67}$ part of an
 “ inch.—And the surface of the plant above ground being 5616 square inches, by
 “ which dividing the thirty-four cubick inches, viz. $\frac{34}{5616}$ is $\frac{1}{165.67}$, this gives the depth
 “ perspired by the whole surface of the plant above ground, viz. $\frac{1}{165.67}$ part of an inch.
 “ Hence the velocity with which water enters the surface of the roots to supply the
 “ expence of perspiration, is to the velocity with which their sap perspires, as 165:67,
 “ or as $\frac{165}{67}$: $\frac{1}{165.67}$, or nearly as 5:2.—The area of the transverse cut of the middle of the
 “ stem is a square inch; therefore the areas, on the surface of the leaves, the roots and
 “ stem, are 5616, 2276.1.—The velocities in the surface of the leaves, roots, and
 “ transverse cut of the stem, are gained by a reciprocal proportion of the surfaces.

$$\text{“ Area of } \left\{ \begin{array}{l} \text{leaves} = 5616 \\ \text{roots} = 2276 \\ \text{stem} = 1 \end{array} \right\} \text{ velocity } \left\{ \begin{array}{l} = \frac{1}{5616} \\ = \frac{1}{2276} \\ = 1 \end{array} \right\} \text{ or as } \left\{ \begin{array}{l} \frac{1}{165.67} \text{ inch.} \\ \frac{1}{67} \text{ inch.} \\ 34 \text{ inch.} \end{array} \right.$$

“ Now, their perspiring 34 cubick inches in twelve hours day, there must so much
 “ pass through the stem in that time; and the velocity would be at the rate of 34

a new bark succeed. But not only the wet, which is to be diverted by trenching the ground, is exitial to many trees, but their repletion of too abundant nourishment; and therefore sometimes there may be as much occasion to use the lancet as venæsection to animals; especially if the hypothesis hold, of superfluous moisture's descent into the roots, to be concocted; but where, in case it be more copious than can be there

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“ inches in twelve hours, if the stem were quite hollow.—In order therefore to find
 “ out the quantity of solid matter in the stem, July 27, at 7. a. m. I cut up even
 “ with the ground a Sun-flower; it weighed 3 pounds; in thirty days it was very dry,
 “ and had wasted in all 2 pounds 4 ounces; that is, $\frac{2}{3}$ of its whole weight; so here is
 “ a fourth part left for solid parts in the stem, (by throwing a piece of green Sun-
 “ flower stem into water, I found it very near of the same specifick gravity with water)
 “ which filling up so much of the stem, the velocity of the sap must be increased pro-
 “ portionably, viz. $\frac{1}{3}$ part more, (by reason of the reciprocal proportion) that 34 cu-
 “ bick inches may pass the stem in twelve hours; whence its velocity in the stem will
 “ be $45\frac{1}{3}$ inches in twelve hours, supposing there be no circulation, nor return of the
 “ sap downwards.—If there be added to 34, (which is the least velocity) $\frac{1}{3}$ of it = $11\frac{1}{3}$,
 “ this gives the greatest velocity, viz. $45\frac{1}{3}$. The spaces being as 3 : 4. the velocities
 “ will be 4 : 3 : $45\frac{1}{3}$: 34.—But if we suppose the pores in the surface of the leaves
 “ to bear the same proportion as the area of the sap-vessels in the stem do to the area
 “ of the stem; then the velocity both in the leaves, root, and stem, will be increased
 “ in the same proportion.—A pretty exact account having been taken of the weight,
 “ size, and surface of this plant, and of the quantities it has imbibed and perspired,
 “ it may not be improper here to enter into a comparison of what is taken in and per-
 “ spired by a human body, and this plant.—The weight of a well-sized man is equal
 “ to 160 pounds: the weight of the Sun-flower is 3 pounds; so their weights are to
 “ each other as 160 : 3, or as 53 : 1.—The surface of such human body is equal to
 “ 15 square feet, or 2160 square inches.—The surface of a Sun-flower is 5616 square
 “ inches; so its surface is, to the surface of a human body, as 26 : 10.—The quan-
 “ tity perspired by a man in twenty-four hours is about 31 ounces, as Dr. Keill found.
 “ *Vid. Medic. Stat. Britan.* p. 14.—The quantity perspired by the plant, in the same
 “ time, is 22 ounces, allowing two ounces for the perspiration of the beginning and
 “ ending of the night in July, viz. after evening, and before morning weighing, just
 “ before and after night.—So the perspiration of a man to the Sun-flower is as
 “ 141 : 100.—Abating the six ounces of the thirty-one ounces, to be carried off by
 “ respiration from the lungs in the twenty-four hours (which I have found by certain
 “ experiment to be so much, if not more); the twenty-five ounces multiplied by 438,
 “ the number of grains in an ounce avoirdupois, the product is 10,950 grains; which
 “ divided by 254, the number of grains in a cubick inch of water, gives 43 cubick
 “ inches perspired by a man: which divided by the surface of his body, viz. 2160
 “ square inches, the quotient is nearly $\frac{1}{50}$ part of a cubick inch perspired off a square

Book II. elaborated, it turns to corruption, and sends up a tainted juice, which perverts the whole habit of the tree: In this exigence therefore, it were, perhaps, more advisable to draw it out by a deep incision, and to depend upon a new supply, than, upon confidence of correcting this evil quality by other medications, to let it perish. Other causes of their sickness, not always taken notice of, proceed from too liberal refreshments and over-

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“ inch in twenty-four hours. Therefore in equal surfaces, and equal times, the man
 “ perspires $\frac{1}{3}$, the plant $\frac{1}{15}$, or as 50 : 15.—Which excess in the man is occasioned
 “ by the very different degrees of heat in each; for the heat of the plant cannot be
 “ greater than the heat of the circumambient air, which heat in summer is from 25 to
 “ 35 degrees above the freezing point; but the heat of the warmest external parts of
 “ a man's body is 54 such degrees, and the heat of the blood 64 degrees; which is
 “ nearly equal to water heated to such a degree as a man can well bear to hold his
 “ hand in, stirring it about; which heat is sufficient to make a plentiful evaporation.
 “ *Qu.* Since then the perspirations of equal areas in a man and a Sun-flower are to
 “ each other as 165 : 50; or as $3\frac{1}{3}$: 1; and since the degrees of heat are as 2 : 1, must
 “ not the sum or quantity of the areas of the pores lying in equal surfaces, in the man
 “ and Sun-flower, be as $1\frac{1}{3}$: 1? for it seems that the quantities of the evaporated fluid
 “ will be as the degrees of heat, and the sum of the areas of the pores taken together.
 “ Dr. Keill, by estimating the quantities of the several evacuations of his body,
 “ found that he eat and drank, every twenty-four hours, 4 pounds 10 ounces.—The
 “ Sun-flower imbibed and perspired in the same time 22 ounces; so the man's food,
 “ to that of the plant, is as 74 ounces to 22 ounces, or as 7 : 2.—But, compared
 “ bulk for bulk, the plant imbibes 17 times more fresh food than the man: for deduct-
 “ ing 5 ounces, which Dr. Keill allows for the *feces alvi*, there will remain 4 pounds
 “ 5 ounces of fresh liquor, which enters a man's veins; and an equal quantity passes
 “ off every twenty-four hours. Then it will be found that 17 times more new fluid
 “ enters the sap-vessels of the plant, and passes off in twenty-four hours, than there
 “ enters the veins of a man, and passes off in the same time.—And since, compared
 “ bulk for bulk, the plant perspires 17 times more than the man, it was therefore very
 “ necessary, by giving it an extensive surface, to make a large provision for a plentiful
 “ perspiration in the plant, which has no other way of discharging superfluities;
 “ whereas there is provision made in man, to carry off above half of what he takes in,
 “ by other evacuations.—For since neither the surface of his body was extensive
 “ enough to cause sufficient exhalation, nor the additional reek, arising from the heat of
 “ his blood, could carry off above half the fluid which was necessary to be discharged
 “ every twenty-four hours; there was a necessity of providing the kidneys to percolate
 “ the other half through.—And whereas it is found that 17 times more enters, bulk
 “ for bulk, into the sap-vessels of the plant, than into the veins of a man, and goes
 “ off in twenty-four hours; one reason of this greater plenty of fresh fluid in the vege-
 “ table than the animal body, may be, because the fluid which is filtrated through the

watering in dry and scorching seasons, especially in nurseries: The water should therefore be fitly qualified, neither brackish, bitter, stagnant, or putrid, sour, acrimonious, vitriolic, arenous and gravelly, churlish, harsh, and lean (I mention them promiscuously); and whatever vicious quality they are perceptibly tinctured and impregnated with, they are by no means proper drink for plants. Wherefore a very critical examen of this so necessary an element (the very principle, as some think, and only nutriment of

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“ roots immediately from the earth, is not near so full freighted with nutritive particles as the chyle which enters the lacteals of animals; which defect it was necessary to supply by the entrance of a much greater quantity of fluid. And the motion of the sap is thereby much accelerated, which in the heartless vegetable would otherwise be very slow; it having probably only a progressive and not a circulating motion, as in animals. Since then a plentiful perspiration is found so necessary for the health of a plant or tree, it is probable that many of their distempers are owing to a stoppage of this perspiration by inclement air.—The perspiration in men is often stopped to a fatal degree; not only by the inclemency of the air, but by intemperance, and violent heats and colds. But in the more temperate vegetable, perspiration can be stopped only by inclement air; unless by an unkindly soil, or want of genial moisture, it is deprived of proper or sufficient nourishment.—As Dr. Keill observed in himself a considerable latitude of degrees of healthy perspiration, from a pound and a half to 3 pounds; I have also observed a healthy latitude of perspiration in this Sun-flower, from 16 to 28 ounces, in twelve hours day. The more it was watered, the more plentifully it perspired, (*cæteris paribus*) and with scanty watering the perspiration much abated.”

From these accurate experiments, it is evident that vegetables inspire and expire. Pure air is necessary for animals. Vegetables require the same. When obliged to breathe their own vapours, they become unhealthy. For that reason corn is seldom good in small inclosures; neither are trees healthy when much crowded. The superior goodness of the grain produced by the drill and alternate husbandry, evinces the necessity of a free circulation of air. There is a certain height to which the soil ought to raise the ears of corn. When, from too much closeness, they are elevated beyond that pitch, the real nourishment that should go to the grain, is spent upon the straw. The stems also, that should have been hardened by the air, become weak, and unable to stand against moderate storms of wind and rain.—The Culture of Beans shews the truth of this observation. When sown too thick, they push themselves upward with seeming vigour, and the crop has the appearance of being a good one. But when examined, we find the pods small, and few in number. On the contrary, when sown in drills, with proper intervals, the straw is shorter, and the pods much larger, and more numerous. I do not argue for the drill husbandry in general; but with regard to Beans, it is a rational and profitable practice.—Farmers may object to the difficulty of keeping the intervals clear of weeds. When hoers cannot be procured, sheep

BOOK II. vegetables) is highly to be regarded, together with more than ordinary skill how to apply it: In order to which, the constitution and texture of plants and trees are philosophically to be considered; some affecting macerations with dung and other mixtures, (which I should not much commend) others quite contrary, the quick and running spring, dangerous enough, and worse than snow-water, which is not in some cases to be rejected: Generally, therefore, that were to be chosen, which, passing silently through ponds and other receptacles, is exposed to the sun and air. This approaches nearest to that of rain dropping from the uberous cloud, and is:

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are excellent weeders. The intervals, however, are best cleaned by the common horse-hoe. A drill crop of Beans is always superior to a crop sown by the hand.—But to return to our philosophical argument.—The analogy that subsists between plants and animals, has induced some very eminent naturalists to suppose a regular circulation of the vegetable juices. M. Perrault, M. Major, M. Marriotte, Malpighi, and our countryman Grew, contended, much about the same time, for the circulation of the sap. According to their microscopical observations, the wood of trees, and the flesh of plants, consist of fine capillary tubes, which run parallel from the root, through the trunk and branches. These they looked upon as arteries. Other minute vessels were observed running between the wood and inner bark, which they distinguished by the name of Veins. They also described, very correctly, the Tracheæ, or air-vessels, which take their course through the fibres of the wood.—These anatomical preliminaries being settled, they proceeded to reason in this manner.—The root having absorbed a quantity of juice from the earth, it is made to ascend through the vessels of the wood, by the alternate expansion and contraction of the Tracheæ, assisted by the natural absorption of the sap-vessels themselves. They supposed the sap to be rarefied to the degree of a fine vapour, in which state it mounted upward to the extreme parts of the plant, where, meeting with the external air, it became condensed into a liquor, and in that form returned to the root by the venal system, between the wood and bark. Dr. Hales, in the most satisfactory manner, set aside this doctrine, and substituted another in its place, more consonant to reason and experiment.—It is something remarkable that Dr. Hervey should have been the first who established the *circulation* of the blood, in opposition to most of the anatomists in Europe; and that Dr. Hales should have clearly disproved the *circulation* of the sap, contrary to the opinion of almost every naturalist of his time.—In order that we may have a distinct view of the motion of the sap, it will be necessary to reflect, that the root, stem, branches, and leaves are constructed in the same manner. Sallows, Willows, Vines, and most Shrubs, will grow in an inverted state, with their tops downward in the earth. Dr. Bradley describes the manner of inverting a young Cherry-tree, the roots of which will put forth leaves, and the branches become roots. Hence it is obvious that the nutritive matter may be conveyed as well by the leaves as the roots, their vascular structure being the very same.—We have now settled the anatomical structure of a plant. Upon it de-

certainly the most natural and nursing: As to the quantity, some plants require plentiful watering, others rather often, than all at once; all of them sucking it in by the roots for the most part, which are their mouths, and carrying it thence thro' all the canals, organs, and members of the whole vegetable body, digested and qualified so as to maintain and supply their

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pends much of what we know of the vegetable œconomy. The motion of the sap comes next to be examined.

During the heat of a summer's day, all plants perspire freely from the pores of their leaves and bark. At that time the juices are highly rarefied. The diameters of the Tracheæ, or air-vessels, are enlarged, so as to press upon and straiten the vessels that carry the sap. In consequence of which their juices, not being able to escape by the roots, are pressed upward, where there is the least resistance, and perspire off the excrementitious parts by the leaves and top-branches, in the form of vapour. When the solar heat declines, the Tracheæ are contracted; the sap-vessels are enlarged, and the sap sinks down in the manner of the spirits of a thermometer. In consequence of this change, the capillary vessels of the leaves and top-branches become empty. Being surrounded with the humid vapours of the evening, they fill themselves from the known laws of attraction, and send down the new-acquired juices to be mixed with those that are more elaborated.—As soon as the sun has altered the temperature of the air, the Tracheæ become again distended, and the sap-vessels are straitened. The same cause always produces the same effect; and this alternate ascent and descent, through the same system of vessels, continues as long as the plant survives.—The irregular motion of the stem and branches, is another cause that contributes to the ascent of the sap. Every time that these parts are acted upon by the air, they are made to assume a variety of angles, whereby the sap-vessels are suddenly straitened. The contained juices consequently receive reiterated impulses, similar to what happens to the blood of animals from the contraction of the heart. This observation may assist us in investigating the vegetable œconomy, so far as it regards the management of fruit-trees, and probably may be extended throughout the whole system of gardening, planting, and farming.—It may be objected, that trees fixed to the wall do, notwithstanding, carry their sap to the extreme branches; but it should be considered that the warmth of their situation, assisted by the horizontal direction of their branches, is fully sufficient to propel the sap, without the undulatory motion that I have mentioned.

I beg leave to remark, that these observations are only intended to convey a general idea of the motion of the sap. It varies according to the temperature of the weather. The air is seldom one moment alike. The sap must therefore sometimes move quick, sometimes slow. It may rise and fall many times in a day. Sudden heats push it upward, sudden colds make it fall. Thus the juices are blended, and the secretions forwarded.—The manner that the nutritive juices of the earth and atmosphere are conveyed into the sap-vessels, remains to be described. And this makes a necessary part of our present argument, as it may assist us in finding out, and explaining, the diseases

Book II. beings and growth, for the producing of whatever they afford for the use of man, and other living creatures.

Fifthly, The bark-bound are to be released by drawing your knife round deep from the root, as far as you can conveniently, drawing your knife

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of plants from the variations of the weather.—The outer bark which covers every external part of a vegetable, as well below as above the surface, is full of perspiratory or absorbent holes. The vessels of this bark being endowed with the power inherent in capillary tubes, draw up the moisture that is applied to their surface. From them it is committed to the vessels of the inner bark. After receiving some degree of melioration, the sap is delivered to the blea. From the blea, it passes, by anastomosing canals, to the vascular series. From thence to the wood, or flesh, where it receives its last concoction.—The nutritive particles, being separated by the mechanism of these numerous canals, are applied towards the fructification and increase of the plant; while the watery and excrementitious parts are carried expeditiously to the leaves, where they are perspired off in the form of vapour. It is evident, however, that, as water contains but few particles that are fit for nourishment, it was necessary that plants should have the power of imbibing a large portion of that fluid. For which reason the Sun-flower, considered bulk for bulk, takes in seventeen times more nourishment than a man, and consequently perspires more.—During the continuance of dry north-east winds, the leaves of corn are observed to grow yellow, and the early-set fruit frequently falls off. This is owing to the want of moisture in the atmosphere to fill the vessels of the leaves and top-branches, whereby the fruit is deprived of nourishment. Under such circumstances, it is probable that wall-fruit may be preserved by prudently watering the leaves and top-branches during the heat of the day. It is, however, a singular happiness that the air is at no time perfectly free from moisture. Bring a bottle of cold water into the warmest room, and its surface will immediately be covered with a thick dew. An air absolutely dry, would in a few days annihilate the vegetable creation.—The air is justly said to contain the life of vegetables, as well as animals. It is a compressible and elastic fluid, surrounding the face of the globe, and reaching to a considerable height above it. Vegetables do not grow in vacuo, and animals die when deprived of air. It has two states, being either elastic or fixed. Dr. Hales observes, that, in its elastic and active state, it conduces to the invigorating the juices of vegetables; and, in its fixed and inert state, gives union, weight, and firmness to all natural bodies. By his experiments we are informed, that fixed air constitutes near one third part of the solid contents of the heart of Oak. It is found to bear the same proportion in Pease, Beans, and other vegetable substances. Heat and fermentation render it elastic. It is again capable of being absorbed and fixed. Was the whole air of the universe brought at once into an elastic and repulsive state, every thing would suffer a sudden dissolution. Was it entirely fixed, then all things would be reduced to an inert lump. Almighty Providence has provided against these extremes,

from the top downwards half way, and at a small distance from the bottom upwards, the other half; this, in more places, as the bulk of stem requires; and if crooked, cut deep and frequent in the ham; if the gaping be much, fill the rift with a little cow-dung. Do this on each side, and at spring, February or March: Also cutting off some branches is profitable, especially such as are blasted, or lightning-struck.

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and in the most wonderful manner preserves the balance.—Air is to be found in every portion of earth; and as it always contains a solution of the volatile parts of animal and vegetable substances, we should be careful to keep our stiff soils as open as possible to its influence. It passes, both in its active and fixed state, into the absorbent vessels of the root, and, mixing with the juices of the plant, circulates through every part. Dr. Hales, in his statical experiments upon the Vine, discovered it ascending with the sap in the bleeding season.

Having demonstrated that the motion of the sap depends upon the influence of the air, and the power of absorption common to all capillary tubes, it naturally follows, that it cannot remain one moment at rest. The gradations from heat to cold, and *vice versa*, are infinite, and sometimes desultory. So must the motion of the sap. From the combinations of the nutritive particles, a number of different fluids are prepared in the same plant. Matter is the same in all; but the modification of it makes things sweet or sour, acrid or mild.—The universal juice of a plant is a limpid subacid liquor, which flows plentifully from a wound made in a tree when the sap is rising. The Birch and the Vine yield it in great abundance. This liquor, as it moves thro' the innumerable small vessels, becomes more and more concocted, and is the general mass from which all the juices are derived. It may be called the blood of the plant. By a certain modification it produces high-flavoured oils, gums, honey, wax, turpentine, rosin, and even the constituent parts of the plant itself. How this transmutation is performed, remains, and perhaps ever will remain, unknown.

I hope it will not be objected to me, that in this examination I have been too minute. In the history of nature we cannot be too particular. Every part of it demands our most serious attention, and every part of it repays us for the labour we bestow. The wings of the butterfly are painted by the same Almighty hand that made the sun. The meanest vegetable, and the most finished animal, are equally the care of Providence. We constantly view the wisdom of God in his works; and yet, as the wise man observes, “hardly do we guess aright at the things that are upon the earth, and “with labour do we find the things that are before us.”

3. GENERATION. It is well known that the antients supposed two sorts of generation; to wit, equivocal and univocal. This latter, they said, took place when any thing was produced from its proper egg or matrix; the equivocal, when any living thing was generated fortuitously or by chance, from the confused mixture of particles. Thus, *æg.* they believed that fleas were generated from urine and saw-dust; that myriads of

BOOK II. If, as sometimes, it proceed from the baking of the earth about the stem, lighten and stir it.

Sixtly, The Terebo, Cossi, and other worms, lying between the body and the bark (which they separate) poison that passage to the great prejudice of some trees; but the holes once found, they are to be taken out with a

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Little insects like atoms came up out of slimy water, and maggots out of cheese in the summer; that several sorts of herbs quickly sprang up out of mould taken from a considerable depth below ground; and, lastly, that worms were produced from putrid carcasses. Others thought that the Creator, at the beginning, mixed seeds and eggs with the earth every where; so that when such earth was dug up, and the sun, by his heat, had hatched the seeds, they imagined that herbs, plants, and animals sprung up, which were concealed therein from the creation. But all the ingenious men of this age, who have imbibed the sound principles of natural philosophy and natural history, have long ago rejected this ridiculous opinion. God at the first gave to every living thing its own proper seed, and to each a tendency or propensity to propagate its species; and established this first and great law to remain unalterable, "Increase and multiply." If from putrefaction, and the heat of the sun, living creatures and plants could be produced, it would have been needless, and consequently highly unworthy of the Supreme Being, to have created so many and so amazingly curious vessels for the preparation of the seed; for in that case putrefaction would be equivalent to creation. And if very minute insects and other animals could be produced from putrefaction, and hatched by the heat of the sun, why might not horses, elephants, and other large animals, be produced in the same way? For in large bodies the mechanism is easier, as the matter is more manageable; but in such minute insects, and, as we may say, such nothings, what wisdom, what power, what inexplicable perfection is displayed, since nature is never more compleat than in her most minute works! He must be void of understanding who does not perceive the absurdity of equivocal generation, when he sees a body made with such wonderful art, and adorned with so many thousand pipes and canals, that no mechanic, even the most perfect of mortals, can find out all the contrivance, much less imitate this wonderful fabric; yet can, as it were by a wilful mistake, say, that he believes all those things were made by a fortuitous and confused concurrence of atoms. For it would follow from hence, that new species both of animals and plants would always occur, neither of which we observe, or have any account of. In this case too, there could be no arguing from the genera to the species. In a word, there would be no such thing as certainty, but all confusion. Redi, having a mind to examine equivocal generation, put recent flesh into a glass vessel, covered with a very thin linen cloth, and exposed it to the sun; after a little time, he found that flies laid their eggs upon the linen cloth; but no maggots were produced in the flesh. We must not conclude that insects are produced by equivocal generation, because we see many thousands of them about pools and ditches, where the putrefying filth of those places furnishes

light incision, and the wound covered with loam. Or, let the dry part of the wood, bark and all, be cut, applying only a wash of pifs and vinegar twice or thrice a week during a month: The best means to find out their quarters, is to follow the Wood-pecker and other birds; these pitching upon the stem, as you may observe them, and knocking with their bills, give notice that the tree is infected, at least between the bark. But there

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plentiful nourishment for them, which is the reason that their eggs are rather deposited there, and are more easily hatched, and thrive better, as lice abound more on the scald heads of children, because of their plentiful nourishment. The *Stapelia Hirtusa* produces a flower that stinks like carrion, for which reason the flesh-flies, deceived by the smell, fill the whole flower full of their eggs, taking it for putrid flesh. We have no reason to believe, what some have asserted, that wheat degenerates into barley, and barley into oats, and oats into brome-grass; for every species produceth its own like; nor was it ever known that the fierce eagle produced the timorous dove. Having confuted equivocal generation, it will follow that every living thing is produced by univocal generation, or from an egg. Now vegetables, we have already proved, are endued with life, therefore they also proceed from eggs. And indeed the great Harvey long ago maintained this doctrine, that every living thing derives its origin from an egg. But some of the moderns have strenuously endeavoured to overthrow this opinion, their cause being chiefly supported by such arguments as the following: If, say they, we take a part from the root, and set it in the ground, it strikes root, and a new plant springs up; again, if a polypus is cut into several parts, from each of these parts an entire and compleat polypus is formed, according to the late discoveries of Trumbull and others. But do we not as frequently see that a plant produces from the same root several shoots or stems? For a stem is nothing but a root above ground; for which reason, if we turn a tree, *e. g.* the Lime tree, upside down, the stem will become the root, and the root be changed into branches, which we may reckon among the late discoveries in gardening. Besides, what we have said is farther confirmed by the branches, all of which spring from the stem or root; but the stem or root from whence this branch or shoot was taken, rose from a seed or egg. The same thing may be said of the polypus among animals; and therefore a polypus lives a vegetable life, or a vegetable lives the life of a polypus: and this manner of propagation, tho' very rare in the animal creation, is extremely common in the vegetable kingdom. No one ought to wonder that new leaves are produced every year from the root or branches; for in the same manner do we daily see the feathers of birds produced. A feather, which is a most curious piece of workmanship, consists of a concave base, filled with a vessel like a lymphatic, so that the aliment can pass upward but not downward; next there is the midrib, and the lateral branches both partial and proper, so that a feather may be compared to a fern twice compounded. Now daily experience informs us that feathers, though adorned with such curious mechanism, fall off every year, and that others, springing from the body of the bird, succeed in their room. Moreover, it is

BOOK II. are divers kinds of these *χυλόφαγοι*, of which the *τερηδών*, or tarmes, already mentioned, will sometimes make such a noise in a tree, as to awaken a sleeping man: The more rugous are the *Cossi*, of old had in *Deliciis* amongst the Epicures, who used to fatten them in flour; and this (as Tertullian and S. Hierom tell us) was the chief food of the Hierophantæ Cereris, as they are this day a great regalo in Japan: In the mean time, experience

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evident that feathers grow only out of the body of the bird, that this body is their root, and that this root owes its origin at first to a feed or egg. The same also holds in plants: therefore polypi, and plants of every kind, have undoubtedly seeds or eggs, by which they are multiplied, without being cut or propagated by shoots, layers, branches, or suckers. Add to this, that the famous Bern. Jussieu discovered eggs of seeds in the polypi, as may be seen in the Transactions of the Stockholm Society for the year 1746.

Here we are to observe, that all viviparous animals have their eggs, out of which comes their offspring, though these eggs are contained in their proper matrix, and excluded in due time, in the same manner as an egg in the nest cherished by the incubation of the bird, whose uterus is the nest. Nor can we deny, but the smallest vegetables have seeds, although often not discoverable by the naked eye. Valisnerius has discovered the seeds in Ducks-meat, and Michelius has done the same in the *Mucor* and *Byssus*; Bobart in the Ferns; Linnæus in the Mosses; and Reaumur in the Fungi. The antients thought that misleto was produced without seed, having seen it often grow from the underside of branches; for how the seeds of the misleto could be conveyed from one tree to another, and there adhere to the underside of the branches, was very difficult for them to conceive. But time has discovered, that the Thrush, swallowing the berries on account of the pulp, afterwards voids the seeds entire, which stick with the excrements to the branches. These viscous seeds are washed by the rains, so that some of them are often protruded to the lower side of the branches, where they grow.

Some people are persuaded, that the sessile and flat funguses on trees are morbid excrescences; but it is plain they are true species of those agarics which are furnished with caps and stems, and grow on the ground, whose seeds falling on a moist tree, produce, as it were, half caps without stems. That seeds are the eggs of plants appears from hence, that as every egg produces an offspring similar to the parent, so also do the seeds of vegetables, and consequently they also are eggs. The containing parts of a hen's egg are, the shell, the external film or membrane, the internal membrane lying immediately under the former, the chalazæ, or membrane inclosing the yolk, twisted at the extremities. The parts contained are, the air within the external membrane at the obtuse end of the egg, the thinner and exterior part of the white, the interior and thicker part of the white, the yolk, the hilum, scar or cicatrice, in the center of which is the speck of life. When an egg is set under the hen, after two days incubation, the speck of life becomes red, sends out its blood-vessels through the yolk, and at last

has taught us, that millipedes, (plentifully found under old timber-logs) being dried and reduced to powder, and taken in drink, are an admirable specifick against the jaundice, scorbut, &c. to purify the blood, and clarify the sight. CH. VIII.

There is a pestilent green worm which hides itself in the earth, and gets into pots and cases, eating our seedlings, and gnawing the very roots, which

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we find the whole chick is formed out of the speck of life; the yolk becomes the fecundines; the white, that fluid which nourishes the chick in the egg, or liquor of the amnion, and the two membranes, become the amnion and chorion. A feed has also a shell, external membrane or film, a membrane including the yolk, the yolk itself, and the scar or point of life. In feeds the white is wanting, there being no use for it, as the moisture of the earth supplies its place, and nourishes the embryo of the plant. Likewise the eggs of fishes have no white, because they are always in the water. When the flower is going off, the feed begins to swell, and on its outside there is seen a vesicle, which is the amnion of Malpighi, furnished with an umbilical cord or navel-string, which is produced thro' the chorion to the opposite side of the egg. While with the egg the amnion increaseth, on its top is observed another small body, which likewise increaseth continually, till it has filled the whole chorion and egg; and the amnion and chorion are turned into the external shell or coat of the seed. See Logan's Exper. 9, by which it appears that the same changes are brought about in the feed as in the egg; and therefore, that the seeds are the eggs of plants cannot be doubted. That plants spring from the yolk of the egg is farther confirmed by the lobes, which, when we speak of cows and other similar quadrupeds, are nothing else than several fecundines, always adhering to the fœtus, drawing their supply of fluids from the matrix, which fluids they prepare for the nourishment of the tender fœtus. That most plants have feminal leaves or lobes is very well known. Now these feminal leaves once constituted the whole feed, except the hilum, or little heart, in which is the point of life; and these lobes prepare the nourishment for the very tender plant, until it be able to strike root in the earth; in the same manner as the yolk in an egg, becoming the placenta, prepares the nourishment, and sends it by the navel-string to the chick; after which they drop off. Hence it appears, that the feminal leaves are the lobes: But since all lobes come from the egg or feed, we may fairly conclude that plants are produced from eggs.

From what has been said, it appears that all vegetables have eggs from which they are produced. Now daily experience teaches us, that no egg can produce an animal, till it be impregnated or fecundated by the male: A hen indeed will lay eggs, but not such as will produce a chicken, unless they are impregnated or fertilized by the cock or male. That all generation precedes the birth, appears throughout universal nature. In quadrupeds it does without doubt: but as to fishes, there is a vulgar notion that their generation follows or comes after the birth or exclusion of their eggs, and that

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should be searched out. And now we mention roots; over-grown toads will sometimes nestle at the roots of trees, when they make a cavern, which they infect with a poisonous effluvium or vapour, of which the leaves famished and flagging give notice, and the enemy dug out with the spade. But this chiefly concerns the gardeners mural fruit-trees; tho' I question not but that even our forest-trees suffer by such pernicious vapours, rats, and other stinking vermin, making their nests within them. But for all these

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the male sperm is emitted upon the eggs after they are excluded from the matrix of the female. But this opinion will soon be laid aside, when it is now made to appear by modern observations, that the male fish emits his sperm a day or two before; that the female, which follows him, greedily devours the same, and thus conceives by the mouth before the exclusion of the eggs. Amphibious animals have their proper laws; for they copulate as all other animals, but with this difference, that the male serpents, in like manner as the crab, have two penes, and the rattle-snake four rough-echinated penes. The generation of frogs is still very obscure; and is likely to be so, till Reaumur shall favour the public with his later observations, which is much to be wished for. In the mean time however, there is no doubt to be made, but that the exclusion of their eggs follows after their copulation. There have been many different opinions of the physiologists, how, or in what manner, generation was brought about, or rather the fecundation, but this remains as great a mystery as ever. The effervescences, precipitations, and other ridiculous notions of the antients, are now justly laid aside: but Physicians have hitherto acquiesced chiefly in two opinions; the first was, that of the great Harvey, to wit, that in the speck of life, or cicatrice, the entire rudiments of the future foetus were present, perfect in all its members, and that it was only requisite that the male sperm should add or excite the first spirit, motion, and life. His followers also contend, that so curious and wonderful a machine as an animal body is, could never be formed and perfected by another machine. And that therefore in the ovarium of the first female there must needs be her offspring or ova, and in them others, and so on in an infinite series through all the subsequent descending generations. In a word, that in the ovarium, or loins, of Eve, the whole race of mankind were contained, whether past, present, or future. Now allowing that matter were infinitely divisible, yet it exceeds all belief, that so many myriads should be contained in one egg. The second hypothesis, or supposition, how generation, or the fecundation of the egg, was brought about, was that of Leuwenhoek, that the cicatrice of the egg was empty, and the male sperm replete with myriads of animalcules, which being admitted into the ovarium of the female, some of them entered the empty ovula contained therein, increased, and at last became a compleat foetus. Thus his followers established their opinion on fancies instead of rational experiments. Gordon argued, that the cicatrice was hollow, and that one animalcule of the male sperm filled it, and by a wonderful metamorphosis was transformed into a compleat animal. Dalempatius maintained, that these animalcules were compleat, and wrapped up in a thin involucrum.

Let our industrious planter (especially the learned favourers of the most refined parts of horticulture) consult the Discourses and Experiments of Sig. Fran. Redi, Malpighius, Leuwenhoek, Swammerdam, &c. with our own learned Doctors, Lyfter, Sloane, Hook, (and other sagacious Naturalists) to shew, that none of these diseases and infirmities in plants proceed from any pure accidental, but real cause; as flatus, venomous liquor, and infections. Some, even of the minutest animals, are provided with instru-

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Andry fancied imaginary valves and perforations in the ovula. Lyfter maintained, that those animalcules served only to excite venery. Valisnerius, that the male sperm was by them only kept in motion. Many of the moderns have adopted this last opinion. For the carina, or keel-shaped appearance, which Malpighi observed as the first rudiments of the foetus that appeared in the egg after incubation, was very like those animalcules; but they have all erred in this affair. For, in the first place, those corpuscles which Leuwenhoek discovered in the male sperm, are by no means animalcules having proper and voluntary motion, but mere inert particles diffused through the male sperm, like so many oily particles swimming in a fluid, as clearly observed by means of good microscopes. 2. If they were really animalcules, according to Leuwenhoek's opinion, to be metamorphosed in the ovula, they must necessarily have their own two tunics; and, by casting those tunics successively one after another, they must be changed, first, from the state of a larva, or grub, into the state of a pupa, nymph, chrysalis, or aurelia, and next into a compleat animal; but the amnion and chorion of the foetus derive their origin from the egg, and not from those animalcules, as they are called. 3. That the Author of Nature always acts in the most compendious way, I think no one will readily deny; so, on the other hand, neither will any one believe that the same All-wise Creator formed so many myriads of animalcules for the sake of one only. 4. How this hypothesis will account for generation, I cannot see; for, supposing that those corpuscles were really animalcules, then they also would have their animalcules by which they were produced, and these last others, and so on without end, which is the greatest absurdity. 5. The secundines are from the yolk, and it is well known, that the yolk is found in an egg not fecundated; if, therefore, we should ascribe the rudiments of the foetus to the male sperm, then the umbilical cord, with its membranes, would be totally distinct from the yolk, and by that means not have the same common tunic with the yolk, which we know to be false. How then generation, or the fecundation of the ovula, is effected, we are wholly ignorant.

When a horse copulates with a she ass, the species produced, which we call Hybrid, mongrel or mule, is neither like the male nor female; which would certainly be the case, were the rudiments of the foetus to derive their origin wholly from one sex only.

That we may make a full enquiry into this subject of the generation of plants, it will be proper to investigate the situation of their genital organs. Now we have proved that the seeds are the eggs of plants, and from the last section it appears that

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ments to pierce the very solid substances of trees and plants, and infuse their pestiferous taint; where likewise they leave their eggs, boring those nestling places with certain terebræ, where we find those innumerable perforations which we call worm-eaten; the wider latebræ are made by erucæ, caterpillars, ants, and bigger insects, raising morbid tumors and excrescences, and preying upon the fruit as well as on the leaves, buds, and flowers, so soon as their eggs are hatched, when they creep out of their

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wheresoever the fecundated eggs are, there we are to seek for the organs of generation; and we shall find the genital organs of plants where the seeds are produced. But the seeds are produced where the flower and fruit are; therefore the flower and fruit are the genital organs of plants. Some have asserted that certain vegetables wanted flowers, and others both flowers and fruit. Tournefort maintained that the *Algæ*, or *Flags*, and *Mosses*, had seeds, but no flower; and that the *Fungi*, and some others, had neither flowers nor fruit. Hence some of the moderns have argued against the fructification. But for one to deny flowers and fruit even to the most minute vegetables, which he finds in all the larger species that can fall under his inspection, is not the part of a fair and rational enquirer. For it is the same as if we should conclude concerning some minute species of insects, that they had neither feet, nor eyes, nor mouth, nor genitals, because we cannot discover them with the naked eye. Bobart sowed the seeds of Ferns, which grew very well. Plumier discovered the flowers in some of the Fern kind, and the same may be easily investigated in the *Trichomanes* of Linnæus. Linnæus discovered the seeds of Mosses, and in the *Polytrichum* we have pretty clear signs of both sexes. In the *Lycopodium Selaginoides*, or Prickly Club-moss, Linnæus observed, that one part of the fructification contained the fertilizing dust, and the other the seeds, which were evident signs that the plant had both flower and fruit. B. Jusseu traced the flowers of the *Pilularia* or Pepper-grass. Reaumur discovered the fructification in the *Fuci*. Linnæus numbered the *stamina* and *pisilla* in the *Jungermannia Epiphylla*, or Broad-leaved *Jungermannia*. Valisnerius has delineated in the *Lemna*, or Ducks-meat, the *calyx*, the *stamina*, the *pisillum*, the *capsula*, and the seeds. Michellius has frequently numbered the *stamina* of the *Fungi*, and has sown their seeds, which grew very well. Nov. Gen. Tab. 68, 73, and 74. Hence therefore we may conclude, that these lowest tribes of vegetables are all furnished with flowers and fruit, although by reason of their exceeding minuteness they have not hitherto been distinctly known to botanists. In short, there never was a clear and evident example produced of any plant which wanted flowers and fruit; and therefore we may justly say, that in their fructification consists the essence of plants.

Universal experience attests, that the flower always precedes or goes before the fruit, in the same manner as generation precedes the birth in animals; so that not one example of the contrary can be produced in any individual. The *Colchicum Autumnale*, or Meadow-saffron, flowers in the autumn, but the fruit, with the stem and leaves, appears the following summer in the months of May and June. The *Hæsel* puts forth its

little caverns in armies, like the Egyptian locusts, invading all that's green, and tender rudiments first, and then attacking the tougher and solid parts of vegetables. To those learned persons above, we may not forget the late worthy and pious Mr. Ray, where, in the Second Part of his Treatise of the Wisdom of God in the Creation, we have a brief, but ingenious account of what concerns this subject, together with what is added about spontaneous productions of these despicable little animals, to which I refer the curious.

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flowers early in the spring; but ripens its fruit or nuts in August. In a word, the flowers always come before the fruit in every plant, without exception.

Since in animals all generation precedes the birth, and in vegetables every flower precedes the fruit, we must necessarily ascribe fecundation to the flower, and the birth or exclusion of the seed to the ripe fruit.

Hence we may define a flower to be the genital organs of a plant serving for fecundation, and the fruit to be the genital organs serving for the birth or maturation of the seed. There has been much dispute among botanists concerning the definition of a flower; many have asserted that the essence of a flower consisted in the corolla or petals: this opinion Knautius embraced, and also denied that there ever were any flowers destitute of petals. But experience and our senses tell us, that there are many plants, some of which want the calyx, as the Tulip, Fritillary, &c. others the corolla, as the Grasses, Cats-tail, Bur-reed, and Pine; others the filaments of the stamina, as the Birthwort; others the style, as the Grass of Parnassus, &c. but that all flowers whatever, except the Mosses only, are furnished with the antheræ or stigmata, or both together; and as this holds universally in every species of plant, (the Mosses only excepted) these parts must necessarily constitute the essence of a flower. If we find a flower with antheræ, but no stigmata, we may also assuredly find another flower either in the same, or a different plant of the same species, which has stigmata with the antheræ, or without them. Pontedera, on the authority of the Hortus Malabaricus, contends, that there are some plants which have no antheræ; *e. g.* the *Cycas Circinalis*, or Sagoe Palm tree, the *Celtis*, or Nettle tree, with some others: But in this he is mistaken, for even the number of the antheræ in those plants he mentions is at present very well known to botanists. The same objection has been made in regard to the *Isœtes*, or Quillwort; but Linnæus discovered the antheræ of this plant; It. Scan.—Hence we perceive the error of the followers of Rivinus, who took the nectaria in the Hellebore, Nigella, and Passion flower, for flowers; which nectaria have properly no pistilla nor antheræ. For the act of fecundation two things are requisite, namely, the genital organs of both sexes; because, as was said above, one of the sexes alone cannot propagate the species. Now the act of fecundation is performed in the flower, therefore it follows, that the genital organs of both sexes must be present in the flower. We are here however to observe, that the genital organs of both sexes are not always present in one and the same flower. It is sufficient that the genital organs of the male be in one flower, and those of the female in another. Since every plant bears seeds.

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Trees, especially fruit-bearers, are infested with the measles, by being burned and scorched with the sun in great droughts; to this commonly succeeds lousiness, which is cured by boring a hole into the principal root, and pouring in a quantity of brandy, stopping the orifice up with a pin of the same wood.

Crooked trees are reformed by taking off or topping the preponderers whilst charged with leaves, or woody and hanging counterpoises.

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by which its offspring can be propagated, and no egg can be hatched before fecundation, it will follow, that fecundation is as necessary as the seeds themselves. Hence it appears, that the genital organs of both sexes, which serve for fecundation, are altogether necessary, if the flower is perfect, and that they are the essential parts. But we find no parts of a flower that are essential but the antheræ and stigmata, therefore these parts are the genital organs of both sexes, serving for fecundation.

The male organs of generation in animals are very different. Some have a penis, as the quadrupeds, birds and serpents, some of the fishes, insects, and worms; others have no penis, as many of the true fishes, and those called shell-fish. Some have seminal vesicles, as the greatest part of quadrupeds; others have none, as the dog kind. Some have testicles distinct from the seminal vesicles, as the quadrupeds; and others have both testicles and seminal vesicles united in one, as the fishes. Now we maintain that the antheræ, the male organs of generation in flowers, are nothing else but the bodies which prepare and contain the male sperm; therefore these antheræ are the testicles together with the seminal vesicles, and their dust the genuine male sperm of plants, answering to those particles which are called animalcules in the male sperm of animals. The truth of this we shall prove by the following arguments. 1. *Preceding the fruit.*—The antheræ and their dust always come before the fruit. When the fruit sheds its seeds, it is come to maturation. This is the case with the antheræ; for when they shed their dust, they are come to maturation, and have done their office; yet their dust is always shed when the flower is in full vigour, and then the antheræ drop, and are useless. 2. *Situation.*—The antheræ are always so situated in the flower, that their dust, which is the male sperm, may reach the pistillum or female organ; for the stamina either surround the pistillum, as in most flowers; or, if the pistillum incline to the upper side of the flower, the stamina do the same, as in the Didynamia; or, if the pistillum nods, the stamina ascend, as in the Cassias, and the common Winter-green. Several plants in the Monœcia Class have the male flowers over the female, as Indian Corn, Palma Christi. 3. *Time.*—The antheræ and stigmata are in full vigour at the self-same time, and this not only when both are in one and the same flower, but also when they are in distinct or separate flowers; so that the long catkins of the Hazel, Birch, Alder, never discharge the dust of their antheræ before the stigmata below them are come out. The male Hemp never sheds its dust before the pistilla of the female plants appear. 4. *Cells.*—Tournefort was of opinion that the antheræ did the office of kidneys, purging the several parts of the plant from all such particles as were not fit for its nourish-

Excorticated and bark-bared trees may be preserved by nourishing up a shoot from the foot, or below the stripped place, and inserting it into a slit above the wounded part; to be done in the spring, and secured from air, as you treat a graft: This I have out of the very industrious Mr. Cook, p. 48. But Dr. Merret brought us in this relation to the Royal Society, that making a square section of the rinds of Ash and Sycamore, (March 1664) whereof three sides were cut, and one not, the success was,

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ment, by receiving them into their cells, and that their valves were burst open by those accumulated excrements. Pontedera's opinion was, that the antheræ are nothing else but a cluster of cells, which receive a peculiar juice or fluid, and then transmit it thro' the filaments to the receptacle, from whence it is carried to the embryos of the seed; but the falsehood of this opinion will appear from the consideration of all the plants of the Diœcia class, the figure of the pollen, artificial fecundation, capricification, and the culture of Palm trees. If we cut asunder the antheræ before they shed their dust, we find their structure altogether as wonderful and curious as the seed-vessels themselves. For within they consist either of one cell, as the Mercury; or two, as Hellebore; or three, as the Orchis; or four, as the Fritillary; and they open or split either longitudinally, as the Leucoium, or greater Snow-drop; or at the base, separating into pieces or valves, as the Barren-wort; or from the top, as the common Snow-drop; or at the two points or horns, as the Whortle, Heath, Winter-green, and Marsh-rosemary.

5. *Castration*.—If we cut off the antheræ of any plant which bears but one flower, taking care at the same time that no other plant of the same species is near it, the fruit proves abortive, or at least produces seeds which will not vegetate. This is a certain truth, which any one will find upon trial.

6. *Figure*.—The figure of the fertilizing dust will clearly convince any one that this fine powder is not accumulated by chance, or from the dryness of the antheræ. Malpighi, Grew, Moreland, and Geoffroy, who have all viewed the figure of these particles with good Microscopes, found all the particles exactly equal to one another, but in different genera as great a difference in shape and figure, as the seeds themselves ever have. As for example, in the Sun-flower the particles are globular and echinated, or full of prickles; in the Bloody Crane-bill, they are like a perforated globule of fire; in the Mallows, they appear like wheels with teeth; in the Ricinus, or Palma Christi, they are shaped like a grain of wheat; in the Panicles, they are angulated; in the Turkey Wheat, flat and smooth; in the Borrage, like a thin leaf rolled up; in the Narcissus, kidney-shaped; in the Comphrey, like double globules, &c. The powder of the antheræ, in point of fecundation, answers to Leuwenhoek's animalcules in the male sperm; and the stigma, which receives this dust, is always moistish, that the dust may instantly adhere or stick to it. The observation of the famous botanist B. Jussieu, concerning the Maple, deserves our notice. "Those Gentlemen (says he) who have examined the fertilizing dust of the Maple by microscopes, have drawn the particles in form of a cross. But I found their form to be globular, and as soon as the particles touched any moisture,

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that the whole bark did unite, being bound with pack-thread, leaving only a scar: but being separated intirely from the tree, namely several parts of the bark, and at various depths, leaving on some part of the bark, other cut to the very wood itself, being tied on as the former, a new rind succeeded in their place; but what was covered over beyond the places of incision with diachylon plaister, and also bound as the rest, did, within the space of three weeks, unite to the tree, though with some shrivelling and

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“they burst into four parts or valves, in the shape of a cross.” From which observation we may infer, that those particles are hollow globules containing some subtle matter within, and that as soon as the hollow globules touch the moisture, they burst and discharge their exceeding fine contents. This last observation throws some light on the generation of animals, from its analogy to the feminal animalcules. Upon the whole it abundantly appears, that the antheræ are the male organs of generation, and their dust the genuine male sperm. Since in every flower the antheræ and stigmata are the genital organs serving for fecundation, and the antheræ the male organs, it is obvious to every one, that the stigmata, the other essential part of the flower, is the female organ of generation, which we shall more fully prove by the following arguments.

The parts of the pistillum are three, the germen, the style, and the stigma. The germen, or seed-bud, while the plant is in flower, is always imperfect and immature, being only the rudiment of the future fetus; the style is no essential part, for it is wanting in many species of plants; but the germen can never bring the fruit to maturity, except it be within the flower along with the stigma. Hence it follows, that the stigma is that part of the flower which receives the impregnating dust. This will farther appear, 1. From the *Situation*.—For we are to consider that the stigma is always so situated, that the antheræ, or their impregnating dust, can reach it, as we have shewn above. Hence the syngenesious plants are rarely barren. Moreover the stigma has always a figure proper and peculiar to itself, so that in most (tho’ not all) plants it is double when the fruit consists of two cells, as in the masked and umbelliferous plants; triple, when the seed-vessel has three cells, as in the Lilies; quadruple, when the seed-vessel has four cells, as in the Grass of Parnassus; there are five stigmata when the seed-vessel has five cells, or five seeds, as in the Geranium, Winter-green, Wood-forrel; there are six stigmata when the seed-vessel has six cells, as in the Asarabacca; there are ten stigmata when the seed-vessel has ten cells, as in the Pork-physick; there are many stigmata when the seed-vessel has many cells, as may be seen in the Mallows, or in the Poppy, which is furnished with as many receptacles for the seed as there are stigmata. 2. *Time*.—The stigmata are always in full vigour at the same time with the antheræ. For in the Indian Wheat, as Logan observes, on the same day that the antheræ burst their inclosure, and hang down in the open air, are seen the bundles and extremities of the styles coming out of the sheath of the spike to open view. 3. *Falling off*.—The stigmata in most plants, when they have discharged their office, drop off in the same manner as the antheræ do; which is a most evident sign that the

scar: The same experiment tried about Michaelmas, and in the winter, came to nothing: Where some branches were decorticated quite round, without any union, a withering of the branch beyond the incision ensued; also a twigg separated from a branch, with a sloping cut, and fastened to it again in the same posture, bound and covered with the former plaister, withered in three days time. Among other easy remedies, a cerecloth of fresh butter and honey, applied whilst the wound is green, especially in

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stigmata contribute nothing to the ripening of the fruit, but serve only for the purpose of generation. 4. *Being cut off*.—If the stigmata be cut off before they have received the impregnating dust of the antheræ, the plant is castrated as to the female organs, and the fruit perishes: A sufficient demonstration that the stigma is that part of the female organ of generation destined for conception. The stigma of a flower has, besides, two other singular properties; namely, that it is always divested of the cuticle or film, nor has it any bark as the other parts, and then it is always bedewed with a moisture. Hence it appears, that the arguments of Pontedera have no force to invalidate our doctrine. For when he would oppose the doctrine of the generation of plants, the whole force of his argument is drawn from the umbelliferous plants, whose styles are not come up when their stamina appear. But the stigma is that part which serves for the purpose of generation, and not the style, which may be wanting in many, as it is not an essential part of the flower. It is sufficient, therefore, that the stigmata in the umbelliferous plants be in full vigour at the self-same time with the antheræ, tho' the style be lengthened after conception, which is the case also in the Maple.

The generation then of plants is brought about by the antheræ shedding their dust on the stigmata. It is not sufficiently clear in what way the generation of animals is accomplished; but thus far we are certain, that the male sperm must come in contact with the female organ, if there be any impregnation. In the vegetable kingdom the genital dust is carried by the air to the moist stigmata, where the particles burst and discharge their exceeding fine or subtle contents, which impregnate the ovary. That this is the case, will be shewn by the following arguments. 1. *Sight*.—When a plant is in flower, and the dust of the antheræ flying about, that part of this dust lights upon and clings to the stigma, is obvious to every beholder. The flower of the Pansies shews this in a most agreeable manner; for, when the flower is scarcely opened, you shall see the stigma, like a concave globe, gaping wide open on one side, and of a pure white colour; but, as soon as the five stamina have discharged their dust, you may observe the whole stigma filled with this genital dust, and covered all over with a yellow or brownish colour, yet the tube of the pistillum remains clear and transparent. Before this impregnation, if you gently squeeze the stigma, there oozes from it a certain sweetish liquor, which retains and attracts the genital dust. In the Hedge-hyssop also the stigma gapes or opens to receive male dust, upon which it shuts, and the ovary being thus impregnated ripens its seed. The Iris shews us a particular structure; for the stigmata spreading wide, wholly cover the antheræ; yet they are so situ-

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summer, and bound about with a thumb-rope of moist hay, and rubbed with cow-dung, has healed many: But for rare and more tender trees, after pruning, take purely refined tallow, mingled and well hardened with a little loamy earth and horse-dung newly made.

Dr. Plot speaks of an Elm growing near the bowling-green at Magdalen-College, quite round disbarked, almost for a yard near the ground,

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ated in regard to the petals, that, by means of a gentle wind under the stigmata, the male dust can mount by the channels of the petals. The *Campanula* differs from other flowers in this, that the male dust adheres to the side of the rough style, and from thence is communicated to the stigma by certain canals. In the syngenesious plants the stigmata rise through a cylinder of the antheræ, and as each stigma comes up, it always brings along with it the fertilizing dust; hence fecundation rarely fails in such plants, as was observed before. 2. *Proportion*.—For the most part the stamina and pistillum are of the same height, that the male dust may more easily come at the stigma; but in some plants it is not so, and then a singular process of fecundation may be observed. In the *Geranium Inquinans*, or African Tree Cranes-bill, with a thick mallow leaf and scarlet flower, where the pistillum is shorter than the stamina, the flowers before they blow are pendulous, but upon their opening they stand upright, that the powder may fall upon the stigma; after which they again nod till the fruit is ripe, and then they stand upright a second time, that their seeds may be more easily scattered about. The same may be seen in the *Claytonia Sibirica*. Some of the Pinks have pistilla longer than the stamina: the flowers do not nod, but the pistilla are reflected or bent back like rams horns towards the antheræ. The flower of the *Nigella Arvensis*, or Horned Field Fennel Flower, when it first opens, has the five pistilla erect and longer than the stamina; but when the flower is well expanded, the styles are bent back that they may touch the antheræ which surround them: when they have received the male dust they are again elevated, and ever after remain erect. In the Tamarind tree, Passion-flower, and Cassias, the styles are reflected nearly in the same manner towards the antheræ. 3. *Place*.—The stamina for the most part surround the pistillum, so that some of the dust is always blown by the wind on the stigma. Plants of the *Didynamia* class, which have their flowers erect, and standing at an acute angle with the stem, bend their stamina and pistilla to the upper lip of the flower, where the stigma, placed among the antheræ, is generally defended from rain. Plants of the *Diadelphia* class, which have their flowers nodding at an acute angle from the perpendicular line, have the stamina and pistilla declining within the keel of the corolla, which is compressed or flat, that the fecundation may be thereby facilitated, while the vexillum keeps off the rain. Plants of the *Monœcia* class have the male flowers mostly placed above the female, that the dust may more readily fall on the pistilla, as may be seen in the *Carex*, Indian Wheat, Job's-tears, Bur-reed, Cats-tail, lesser Bur-dock, *Cassava*, *Ambrosia*, Water-milfoil, Arrow-head, and *Palma Christi*. Yet there

which yet flourishes exceedingly; upon which he dilates into an accurate discourse how it should possibly be, all trees being held to receive their nutrition between the wood and the bark, and to perish upon their separation; this tree being likewise hollow as a drum, and its outmost surface, where decorticated, dry and dead. The solution of this phenomenon (to all appearance, from the verdant head) could not have been more philosophically resolved, than by the hypothesis there produced by the

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are a few exceptions, among which we shall reckon the Pine and the Fir, where the antheræ are so very numerous, that if any animal, or the wind, shake the tree, we may see the dust flying upwards like smoke; and so plentiful is the dust, that if, in the time of flowering of the Pine, Fir, or Juniper, it chanced to rain, the banks of the adjacent standing waters are painted with yellow rings of the dust from those trees. The *Teucrium Flavum*, or Shrubby Germander, has a yellow corolla, the two upper segments of which ascending, press like fingers the antheræ, which are placed on nodding filaments, to the stigma, that the genital powder may touch it, and they continue to cover it for some days after the fecundation, and then resume their former place. The *Veratrum Album*, or White Hellebore, has its male flowers placed below, but the others and upper flowers are all hermaphrodites; for which reason the male flowers, as not being so necessary, are placed lower. 4. Time.—Here we are to observe, that the stamina and pistillum come at the same time, and that not only in one and the same flower, but also where some are male and others female, on the same plant, a very few only excepted. The wonderful contrivance of the great Author of Nature in the *Jatropha*, or *Cassava*, and the Plantain tree, is truly worth our observation. The *Jatropha Urens*, or Prickly Cassava, has a Corymbus, whose first or uppermost forks bear female flowers, which come out a day or two before the males; the other forks, or branches, of the Corymbus produce male flowers, but the female flowers, which come out first, cannot be impregnated by their dust, because they were withered before the males expanded; and therefore those female flowers prove abortive, unless they are impregnated from some other Corymbus which has male flowers at the same time. The *Musa Paradisiaca*, or Plantain tree, produces a spadix, which contains often two hundred germina, the few female flowers of which continue in blow for some days; when the female flowers have done blowing, the males succeed, and continue in flower till the fruit is ripe, in which are to be found no seed at all. Wherefore the authors of the Hortus Malabaricus have asserted that seeds were evidently wanting in the Plantain tree, which seemed a paradox to Linnæus; but when he saw the first female flowers destitute of males, and that the males which followed came too late to impregnate the females, he clearly perceived that no seeds would ever be produced in this species, unless several plants placed together were to flower nearly at the same time, and then one could impregnate the other. There is one thing farther remarkable in the *Musa*, and that is, that it produces two sorts of flowers very different in the same plant, some of which want the stigma, and others the antheræ; the first may be called male herma-

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Doctor, who assures me, he was yet deliberating whether the tree being hollow, it might not possibly proceed from some other latent cause, as afterwards he discovered; when having obtained permission to open the body of it, he found another Elm letting down its stem all the length of this empty case, and striking root when it came to the earth, from whence it derived nourishment, maintaining a flourishing top, and has, till now, passed for a little miracle, as it still may do for a thing extraordinary, and

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phrodites, and the latter female hermaphrodites. Here then we have an unexampled species of Polygamy, where those different flowers may impregnate each other, and one female joined with barren males is impregnated by the males belonging to another female, which is itself barren. Another thing which merits our observation in regard to time is, that when the male and female flowers are in distinct cups on the same plant, or on different plants of the same species, and where the male flowers are not erected perpendicularly over the females, there it is necessary that the flowering be over before the leaves come out, lest the fecundation should be hindered by the intervention of the leaves; *e. g.* in the Mulberry, Mistletoe, Alder, Birch, Hornbeam, Beech, Oak, Hazel, Walnut, and also in the Willow, Sea-buckthorn, *Myrica* or Dutch Myrtle, Poplar, Ash, and Dogs Mercury. 5. *Rains*.—In almost all sorts of flowers we see how they expand or open by the heat of the sun, but in the evening, and in a moist state of the air, they close or contract their flowers, lest the moisture getting to the dust of the antheræ should coagulate the same, and render it incapable of being blown on the stigmata; but (which is indeed wonderful) when once the fecundation is over, the flowers neither contract in the evening, nor yet against rain. Flowers with covered antheræ never shut up in the night-time; *e. g.* those of the *Didynamia* and *Diadelphia* classes. The antheræ of the rye hang out beyond the flower, and if rain falls while it is in flower, the dust is clotted, and hence the husbandmen do truly predict a bad crop of rye, for the kernels are not so numerous, because many of the florets prove abortive. But the antheræ of the barley lie so close within the husk, that the rain cannot get at it. If rain falls upon the bloom of the apple, pear, or cherry, the gardener immediately dreads the blossoms falling off, or proving abortive; and experience confirms the truth of this, for the powder of the antheræ is spoiled; yet this accident oftener happens in the cherry than the apple or pear, for all the antheræ of the cherry flowers discharge their dust at once; but the case is not so in the others. Smoke also is injurious, by drying up the moisture of the stigmata. 6. *Culture of Palm-trees*.—That the cultivators of the common Palm tree, or Date tree, cut off the male spadixes, and place them over the females, is recorded by Theophrastus, Pliny, Prosper Alpinus, Tournefort, Kemfer, and others; and if they neglect to do this, the Dates are harsh, bad-tasted, and many trees wholly destitute of nuts or fruit. The Date-tree is every year thus impregnated in Arabia, Persia, and Egypt, by the inhabitants. “The male spathæ being ripe (says Kemfer) are taken from the top of the tree, the spadixes taken out, and divided into lesser branches, that

rare enough; for not only its passage, and how it should come there, unless haply some of the samara, or seed, of the old tree, when pregnant, should have luckily fallen down within the hollow pipe, or, as might be conjectured, from some sucker springing of a juicy root, but the strange incorporating of the superior part of the bole, with the old hollow tree which embraces it, not by any perceptible roots, but as if it were only one body with it, whilst the rest of the vaginated stem touches

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the rudiments of the fruit may be sprinkled with the minute atoms of their dust; a small branch of the male spadix is fixed into the middle of the female spadix, and thus discharges its dust on the seed-buds. It is remarkable that the spadixes dried are still proper to impregnate the females, and may be kept a whole year without losing their virtue. It sometimes happens that the females are impregnated by the dust blown to them by the wind; but since this is precarious, it is better done by the hand. If there is no impregnation, the female trees inevitably drop all the rudiments of the fruit, which is a great calamity to the owners, and to the country people in general, who are supported by their crop of dates, as we are by our crops of corn. I remember it happened in my time, that the Grand Signior meditated an invasion of the city and territory of Baffora, which the Prince of the country prevented, by giving out that he would destroy all the male Palm-trees on the first approach of the enemy, and by that means cut off from them all supplies of subsistence during the siege." Thus far Kemfer. Hear also what Tournefort says on this subject. "Hagdi Mustapha, Ambassador from Tripoli, told me, that a branch of the flower of the male Palm was inserted into the spathe of the female just at the time the spathe used to open; for when the flower is fully expanded, it sheds its dust, without the assistance of which the Dates would be harsh and ill-tasted, disagreeable, and without stones or kernels, and only fit to be given to camels and other beasts of burden." In the males and females of the *Pistachia* Nut tree they observe the same method as in those of the Date tree. "In Sicily (says Geofroy in his *Materia Medica*) the countrymen pluck clusters of flowers from the male *Pistachia*, with the fecundating dust of which they impregnate the female flowers: Others gather the male flowers, expose them to dry in proper bags, and scatter the prolific dust on the female flowers, that the fruit may not prove abortive, and the crop fail." 7. *Nodding Flowers*.—Since the male dust is generally of a greater specific gravity than the air, in most plants that have the pistillum longer than the stamina, the All-wise Creator has made the flowers nodding, that the powder may more easily reach the stigma, as may be seen in the common Snow-drop, greater Snow-drop, Sow-bread, *Narcissus*, Fritillary, *Campanula*, Dogs-tooth Violet, &c. Now it cannot be said that this happens merely from the weight of the flower, for sometimes the fruit in the same plants, which is ten times heavier than the flower, grows erect, as in the Crown Imperial, Fritillary, and others. 8. *Sunk Flowers*.—The stems of many plants grow under water; but a little before they blow, the flowers emerge or rise above the surface of the water, as

BOOK II. no other part of the whole cavity, till it comes to the ground, is surprizing. This being besides very extraordinary, that a tree, which naturally grows taper as it approaches the top, should swell, and become bigger there than it is below. But this the Doctor will himself render a more minute account of in the next impression of that excellent piece of his; nor had I anticipated it on this occasion, but to let the world know, in the mean

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we see in the Water-lily, Frogs-bit, Broad-leaved Pond-weed, Perennial Arismart, &c. There are others in which all the parts grow under water, as the Water-milfoil, Water-soldier, several of the Pond-weeds, all which, about the time of flowering, raise their flowering stems above the water, which stems sink again as soon as the time of flowering is over. The *Vallisneria* of Micheli, a kind of Pond-weed, which grows in Italy, bears a very long scapus, or flowering stem, but twisted in form of a screw; hence it appears very short. This plant grows in rivulets and ditches under water, and bears on the extremity of its stem one flower only. About the time of blowing, the scapus is lengthened till the calyx has reached the surface of the water; which done, the flower is expanded, and after a few days, the flowering and impregnation being over, it sinks again, the stem turning in a spiral form as before. This is the female plant. The *Vallisnerioides* of Micheli grows in the same places under water, having a flower stem scarce an inch high, which consequently does not reach the surface of the water; this bears many flowers, which, when the time of flowering approaches, drop from the scapus, and rise like little bladders; as soon as they have reached the surface of the water, though before shut, they then open, and swimming about, shed their dust on the female flowers, which are also swimming in the same places. This is the male plant of the former. H. Cliff. 454. Micheli, without attending to the sex, has carefully observed and faithfully described this circumstance. 9. *Syngenesious Flowers*.—The compound flowers are formed in different ways. In the *Polygamia Equalis* all the florets are furnished with stamina and pistilla. In the *Polygamia Superflua* all the florets have stamina and pistilla in the disk or middle of the flower, but in the radius there are only female flowers, which are impregnated by the male dust of those in the disk. In the *Polygamia Superflua* the disk is filled with hermaphrodite florets as in the former; but the female flowers, which constitute the radius, cannot ripen their seed, being all without stigmata. Lastly, the florets of the *Polygamia Necessaria*, which fill the disk, have the stamina and pistilla, but for want of the stigmata these florets bear no seed, and the plants would all have been barren, had not the All-wise Creator furnished the radius, which consists only of female florets, with compleat pistilla that have the stigmata, and consequently ripen the seed. 10. *Consideration of all Sorts of Flowers*.—The tenth and last argument is drawn from the genuine consideration of all sorts of flowers. And here, for the sake of brevity, we shall examine only a few out of the many that might be produced in proof of the Linnæan doctrine of the generation of plants. The *Celosia*, or Cocks-comb, is furnished with a pistillum surrounded by five stamina, whose filaments are joined below

time, how ingenuously ready he is to acknowledge the mistake, as he has been successful in discovering it.

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Deer, conies, and hares, by barking the trees in hard winters, spoil many tender plantations: Next to the utter destroying them, there is nothing better than to anoint that part which is within their reach, with *stercus humanum*, tempered with a little water or urine, and lightly brush-

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by a thin plaited film. In moist weather this film is relaxed, and the antheræ stand at a great distance from one another, but in dry weather the film is contracted, by which means the filaments come close together, so that the antheræ almost touch the stigma, and hence the impregnation is assisted. The *Saxifrage* has ten stamina, in the center of which are two pistilla. After being in flower for some days, two of the stamina, which stand opposite to one another, meet, that their dust may fall perpendicularly down on the stigmata, while their antheræ force open, as it were, each other's farinaiferous cells by rubbing against one another; next day these two stamina recede from one another, and two others supply their place, and thus they continue to do till all the males have discharged their dust in the same manner. The grass of *Parnassus* has five short stamina, one of which, as soon as the filament is sufficiently lengthened, touches the stigma with its anthera, and having discharged its fertilizing dust, immediately rises, and whereas it was bent inward before, it now bends backward, and the filament grows afterwards almost as high as the corolla; then the second stamen comes forward in the same way and manner; then the third, fourth, and fifth, till they have all discharged their office. The *Lychnis Flos Cuculi*, or Meadow Pinks, and the *Gypsophila Fastigiata*, a kind of Soapwort, have procumbent stems; but when the time of flowering approaches, these are raised upright, that the dust of the antheræ, being exposed to the wind, may be more readily blown upon the stigmata. This is also the reason why the greatest part of flowers are elevated on flowering stems above the ground, that the wind may more easily shake them. For the *Narcissus*, *Snow-drop*, *Violet*, *Cross-wort*, and some others, have their stems erect, but after the time of flowering, their stems recline to the ground.

Almost all the spiked plants begin their flowering below, or in the lower part of the stem, that in case the dust of the first should not prove sufficient, that of the latter may make up the loss. Of this sort are also the corymbiferous and umbelliferous plants, not to say the compound flowers, where the florets constituting the radius open first, then follow the interior florets, and the disk is elevated or raised, that the exterior florets may also receive some of their dust, if they were not sufficiently impregnated before. This is so certain and constant a rule, that when *Linnaeus* found the *Hieracium Præmorsum*, the greater Broad-leaved Hawk-weed, or greater Upright Mouse-ear, observe a different order, *i. e.* the uppermost flowers come out first, he thought it a singular instance in nature. The *Pellitory* clearly shews us the process of generation; if we observe it in a morning at a proper hour, we shall see how its an-

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ed on; this renewed after every great rain: But a cleaner than this, and yet which conies, and even cattle, most abhor, is to water or sprinkle them with tanners' liquor, viz. that which they use for dressing their hides; or to wash with slacked lime and water, altogether as expedient; also to tie thumb-bands of hay and straw round them as far as they can reach.

Moss (which is an adnascent plant) is to be rubbed and scraped off with some fit instrument of wood, which may not excorticate the tree, or

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these burst with great elasticity, and emit their dust all round; and, of consequence, also upon the pistillum. The same experiment succeeds, if we touch the anthers with the point of a needle, as Vaillant has observed. The Melons, Pompions, Cucumbers, Gourds, &c. have two sorts of flowers; the one male, which are called barren; the other female, which bear the pistilla and fruit. The gardeners advise, that the barren flowers should be carefully plucked off, by reason they think these deprive the plant too much of its nourishment: But without doubt they are mistaken; for they had better take the entire male flowers and sprinkle the females with their dust at noon, or roll the male flowers on the female, by which means the male dust will readily reach the stigmata, and the females thus impregnated will ripen their fruit; for the reason why the fruit drops off is for want of being impregnated, and not for want of nourishment, as is the vulgar opinion. Hence it is, that if gardeners do not give air to their stoves, so that generation may be assisted by the help of the wind, the fruit drops off, or miscarries. In 1723, a Pompion flowered in Stenbroholt Garden, the male flowers of which were carefully plucked off every day, as soon as they appeared, lest they should draw from the female flowers too much of their nourishment; the consequence was, that not one fruit appeared on the plant that season. If one pluck the flowers of the male Hemp, before those of the female plant are opened, he will get none, or but very few ripe seeds. Yet it happens sometimes, that the female Hemp bears one or two male flowers, by which some of the females may be impregnated; and this circumstance deceived Camerarius. The Hops are of two sorts, the one male, and the other female; and that which they commonly call the fruit, is only the calyx expanded and lengthened; hence the female plants, though not impregnated, can bear cones. This it was which deceived Tournefort, so that he would not acknowledge the sexes of plants, because a female plant of the Hop in the garden at Paris thrived well, and bore fruit in plenty every year, when no male plants were within several miles of it. The same thing happens in the Mulberry and Blite, the berries of which are only succulent calyxes, but not seed-vessels or ovaria. One Richard Baal, a gardener at Brentford, sold a great quantity of Cauliflower seed, which he raised in his own garden, to several gardeners in the suburbs of London, who carefully sowed the seeds in good ground, but they produced nothing but the common long-leaved Cabbage, for which reason they complained that they were imposed upon, and commenced a suit against the aforesaid Baal in Westminster Hall; the Judge's opinion was, that

with a piece of hair-cloth after a fobbing rain; or by setting it on fire with a wisp of straw, about the end of December, if the season be dry, as they practise it in Staffordshire; but the most infallible art of Emuscation, is taking away the cause (which is superfluous moisture in clayey and spewing grounds) by dressing with lime.

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Ivy is destroyed by digging up its roots, and loosening its hold; and even the removal of Ivy itself, if very old, and when it has long invested

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Baal must return the gardeners their money, and also make good their loss of time and crops. Ray's Hist. v. I. p. 42. This cheat we ought not to lay to the poor gardener's charge, for it is wholly to be ascribed to his good plants being impregnated by the common Cabbage. Wherefore, if one has an excellent sort of Cabbage, he ought not to let it flower in the neighbourhood of an inferior sort, lest the good sort should be impregnated with the dust of the other, and the seeds produce a degenerate race. If one intends to plant the Poplar or Willow for walks, let him take only the male plants for this purpose; for if the females are planted, they will multiply so fast as to form a grove instead of a walk. The Juniper does not produce fruit every year in equal plenty; for if rain falls during its time of flowering, the fruit is deprived of the farina, and falls off. A female plant of the Juniper grew for many years in Clifford's garden, but never produced any fruit for want of a male plant. The *Rhodiola*, or Rose-wort, grew in the Upsal garden from the year 1696, at which time Professor Rudbeck brought it thither from the mountains of Lapland; but it never ripened its seeds, being without a male plant. It is needless to mention more examples, though I could easily deduce some singular experiments from many more plants, to corroborate our doctrine of the generation of plants, which the brevity of this dissertation does not allow. I shall not speak of the Maize, the generation of which is denied by Siegfbeck and others, from the situation of the antheræ and pistilla; but refer for this to a Treatise written by Mr. Logan, of Philadelphia, intitled, Experiments concerning the Generation of Plants. Concerning the Hæfel, see the Experiments of Mr. Bradley, late Professor of Botany in Cambridge. As to the Fig tree, we shall explain its peculiar manner of generation, which is called Caprifigation, more at large. Tournefort, while he was in the islands of the Archipelago, accurately observed this, and has described it in the following manner. "There are three varieties of the *Caprificus*, or Wild Fig, (which is the male) called by the natives *Fornites*, *Cratirites*, and *Orni*. These produce their fruit at three different times of the year; the fruit of the *Fornites*, or first variety, begin to bud in August, and hold to the end of November, at which time many small insects make their escape from them, and lay their eggs on the *Cratirites*, or second variety, whose fruit is now coming out. The *Cratirites*, or second variety, bud in the end of September, and hold till May following. The insects sometimes come out of these before the *Orni*, or third variety, are budded; in which case, the husbandmen carefully seek for those trees of the *Cratirites* whose

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its support, is attended with pernicious consequences, the tree frequently dying from the sudden exposure to unaccustomed cold. Of the roots of Ivy (which shrub may, with small industry, be made a beautiful standard) are made curiously polished and flecked cups and boxes, and even tables of great value. Mistleto and other excrescences are to be cut and broken off. But the fungi (which prognosticate a fault in the liver and entrails of trees, as we may call them) is remedied by abrasion, friction, interlucation, and exposure to the sun.

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insects have not yet come out, and tie them on the branches of the *Orni*, that the insects may lay their eggs thereon. The *Orni*, or third variety, bud in May, and are ripe in July. In all the three varieties, certain insects are generated, which deposit their eggs, and these eggs become worms, and afterwards are turned into flies before the fruit falls off. The countrymen chiefly gather the *Orni* in June and July, a little before the dog-days, or when the insects begin to fly, and tie them with threads to the cultivated Fig tree; then the insects, by wounding the orifices of the cultivated Figs, make their way into the cavities of the fruit, which ripen after this in about fourteen days." This riddle we shall now explain. The *Caprificus*, or Wild Fig, is the male plant, and the cultivated Fig the female. The flowers are disposed within the cavity of the receptacle, which is so close shut, that often it will scarce admit the end of a common needle through the pore in its extremity. Now the fig-flies, which are of the ichneumon kind, being transformed, and furnished with wings, about the time the farina of the male Fig is ripe, make their escape from those male Figs, and being wholly covered with their dust, after copulation, they seek for a place to lay their eggs, and flying to every one of the female Figs, they enter their cavities, which are filled with pistilla from all sides, by which means they must necessarily brush off that farina, or male dust, with which they were covered, and thus the seeds are impregnated. It is true, the female Fig can ripen its fruit, though the seeds are not impregnated, because this fruit is not a pericarpium, or seed-vessel, but only a receptacle: so also the Hop, Mulberry, Strawberry, and Blite, can produce fruit, tho' their seeds do not ripen, because their fruit is nothing but a receptacle or calyx. Some botanists who were ignorant of this, seeing those trees produce fruit without previous impregnation, thought they had found an unanswerable argument against the generation of plants; but they did not consider, that the fruit of the Fig is not a seed-vessel, but a common receptacle. Yet it appears, that the fruit of the Fig, if the seeds are impregnated, grow to a much larger size than those which are not; which Tournefort also observed; for he tells us, that a Fig tree, in Franche Comte, where there is no caprification, produced every year only twenty-five pound weight of Figs; but that another of the same size in one of the islands of the Archipelago, produced yearly two hundred and eighty pound weight of Figs, which is above ten times the quantity of the other. This age hath clearly refuted the opinion of Camerarius, who maintained that the seeds of Figs never produced any plants. For Linnæus tells us, that

The bodies of trees are visited with canker, hollownefs, hornets, ear-wigs, fnails, &c. CH. VIII.

The wind-fhock is a bruife and fhiver throughout the tree, though not constantly vifible, yet leading the warp from fmooth renting, caufed by over-powerful winds, when young, and perhaps by fubtil lightnings, to which the ftrongeft Oaks, and other the moft robuft trees, are fain to fubmit, and will be twifted like a rope of Hemp; and therefore, of old, not

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Fig trees are raifed every year in Holland from the feeds, provided the fruit is brought from Italy. But if the fruit grew in France, England, Germany, or Sweden, where there are no Wild Figs, the feeds produce nothing; on the other hand, if thofe feeds are fown, which grew in Italy or the Greek iflands, where the male Fig abounds, the plants fpring up with eafe, putting forth leaves, which at frft are like thofe of the Mallow. The fame experiment was tried with good fuccefs in the Upfal garden in the year 1744. I fhall only briefly mention the utility of infefts in the fecundation of plants. In a great many flowers there is a neftarium, or honey-juice, feparated by the flower, which Pontedera thinks is that balfam which the feeds imbibe, to make them keep and preferve their vegetative quality longer; and as long as this balfam is not dried up or fpoiled, fo long the feeds are fit to germinate. Several infefts, as bees, flies, butterflies, live on this honey-juice only. Quintilian, the Roman Orator, has a very fingular cafe in one of his Orations: "A poor man and a rich man, fays he, had each a fmall garden adjoining to one another. The rich man had many fine flowers in his garden, and the poor man had bees in his. The rich man complained that his flowers were fpoiled by the poor man's bees, which he warned him to remove. The poor man not complying, the other fcattered poifon on his flowers; on which the poor man's bees all died; and Dives is guilty of this great injury. The poor man pleads that the bees did no hurt at all to the rich man's flowers; that neither the Creator, nor any human laws, had ever reftained bees within any certain limits; and therefore the rich man might hinder the bees from fettling on his flowers if he could." But the other might have objected, that the bees were fo far hurtful to his flowers, that they fucked the honey-juice, and carried off the fertilizing duft.—After all, my opinion is, that the bees are more ufeul than hurtful to flowers, fince by their unwearied labours they fpread the fertilizing duft, fo that it may reach the piftillum: for it is not clear what ufe the honey-juice is of in the œconomy of flowers. From what has been faid it appears, that the generation of plants is performed by the genital duft of the antheræ falling on the moift ftigma, or female organ, which duft by the help of the moifture adheres and burfts, difcharging its contents, the fubtle particles of which are abforbed by the ftyle, into the ovarium, germen, or feed-bud. We deny, however, that the duft of the antheræ penetrates through the ftyle to the germen and rudiments of the feed, as Moreland, Geofroy, Logan, and fome others, have fupposed; for one example of the Poppy, from Vaillant, will be fufficient to difprove this, fince it appears,

BOOK II. used to kindle the sacrifice. Trees likewise often suffer the same injury by rigorous and piercing colds and frosts; such as in the year 1683, split many stately timber-trees from head to foot; which, as the weather grew milder, closed again, so as hardly to be discerned, but were found at the felling miserably shattered, and good for little: The best prevention is shelter, choice of place for the plantation, and frequent threading, whilst they are yet in their youth. Wind-shaken is also discovered by certain ribs, boils, and swellings on the bark, beginning at the foot of the stem,

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by ocular inspection, to be false. The species meant, is the *Papaver Orientale*, or the Oriental Rough Poppy, with a large flower. If one opens a flower of this plant, cutting its pistillum perpendicularly downwards, he shall find the lamellæ, or folds, the placentæ, and the small seeds sticking to them, all of a pure white colour, though at the same time the style and all the stigma are wholly tinged with a purple hue from the dust of the antheræ. From whence we may fairly conclude, that not one grain or particle of the farina enters the folds of the receptacle, or the seeds themselves. The *Malva Alcea*, and the *Malva Moschata*, i. e. the Vervain Mallow, and the jagged-leaved Vervain Mallow, have kidney-shaped antheræ, or summits, which contain a dust consisting of large globular particles conspicuous enough to the naked eye, and having their diameters equal to those of the styles; whence it is evident they never can pass through the styles. Needham has observed, that the dust of Martagon Lily consists of rough or prickly globules, which, as soon as they touch any moisture, burst on the sides, and, like an *Æolipile*, with great impetuosity discharge a gelatinous matter, filled with innumerable points and atoms, which impregnate the ovula, or rudiments of the seeds. All the females also among animals discharge a seminal fluid at the same time with the males, and therefore this seminal fluid is also necessary on the part of the female. This same viscid and ropy fluid on the stigmata of plants is called by Malpighi, a turpentine, or balsam. Hence Ray also says, that in no kind of animals that he knew did the sperm enter the ovarium, and in many kinds not even the uterus, or womb itself, but only its exceeding subtle effluvia to impregnate the ovula, or eggs. Upon the whole, I think that the flowering of plants may be truly called their generation, and that the Antients with great propriety named the flower, the joy of plants.

The calyx then is the marriage-bed, in which the stamina and pistilla, the male and female organs, celebrate the nuptials of plants; and here also those tender organs are cherished and defended from external injuries. The corolla, or petals, are the curtains, closely surrounding the genital organs, in order to keep off storm, rain, or cold; but when the sun shines bright, they freely expand, both to give access to the sun's rays, and to the fecundating dust. The filaments are the spermatie vessels by which the juice, secreted from the plant, is carried to the antheræ. The antheræ are the testicles, and may not improperly be compared to the soft roe or milt of fishes. The dust of the antheræ answers to the sperm and seminal animalcules; for, though

and ascending the body of the tree to the boughs. But against such frosts and fire from heaven there is no charm. CH. VIII.

Cankers, of all other diseases the most pernicious, corroding, and eating to the heart, and difficult to cure, (whether caused by some stroke, or galling, or by hot and burning land) are to be cut out to the quick, the scars emplaistered with tar mingled with oil, and over that a thin spreading of loam, or else with clay and horse-dung, but best with hogs-dung alone.

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it is dry, that it may the more easily be conveyed by the wind, yet it gets moisture upon touching the stigma. The stigma is that external part of the female organ which receives the male dust, and on which this male dust acts. The style is the vagina, or tube, through which the effluvia of the male dust pass to the germen or seed-bud. The germen is the ovary, for it contains the unimpregnated or unfertilized seeds. The pericarpium, or seed-vessel, answers to the impregnated ovary; and, in fact, is the same with the germen, or seed-bud, only increased in bulk, and loaded with fertile seeds. The seeds are the eggs, of which we have already fully spoken.— We ought to observe, that the calyx is a production of the external bark of the plant; the corolla, of the inner bark; the stamina, of the Alburnum, or white sap; the pericarpium, or seed-vessel, of the woody substance; and the seeds, of the pith of the tree; for in this manner they are placed; and in this manner also they are unfolded. Therefore in a flower we find all the internal parts of a plant unfolded. This, though obscurely, was taken notice of by Cæsalpinus, and also by Mr. Logan of Philadelphia: Flowers then are nothing else but the genitals of plants, with this difference from those of animals, that *their* organs of generation are reckoned obscene, and modesty forbids us to examine them; for which reason nature has taken care frequently to hide them from our sight. But in the vegetable kingdom it is quite otherwise; for here those parts are not hid, but rather exposed to the view of all. Add to this, that they are the most beautiful of all the parts of plants, in which the study, love, and contemplation of men are conversant. As the genitals of all animals have a rank and strong smell in rutting time, so the flowers, or genitals, of plants also send forth a smell, which, though very different in different plants, is for the most part very agreeable, so that one fancies himself drinking nectar with his nostrils. We see then how the great Creator has enriched the most innocent nuptials of plants with the most singular and superb ornaments. Let us behold the marriage-bed, or calyx, with what art is it constructed! the curtain, or superb covering, called the corolla, how neat and elegant its extremity or termination, how splendidly cut or carved, how fine and thin, and with what lively and beautiful colours is it adorned! We may truly say, in the emphatical language of the scriptures, *that Solomon in all his glory was not arrayed like one of these*. The *Amaranthus Tricolor* wants this beautiful covering of the corolla; but here nature has taken care to cover the flowers with a shade or fine-coloured crown of the leaves, which is laid over the flowers, that the few males, being defended from

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bound to it in a rag; or by laying Wood-ashes, Nettles, or Fern to the roots. You will know if the cure be effected, by the colour of the wounds growing fresh and green, and not reddish: But if the gangrene be within, it must be cured by nitrous, sulphureous, and drying applications, and by no means by any thing of an unctuous nature, which is exitial to trees, tar, as was said, only excepted, which I have experimentally known to preserve trees from the envenomed teeth of goats, and other injuries; the entire stem smeared over, without the least prejudice, to my no small ad-

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flowers, might more easily and safely discharge their farina on the females below. All animals appear most beautiful and healthy just before their copulation. The hart tosses up his prominent horns; the birds shine and glitter with gay colours; the fishes taste then most deliciously. But when the time of copulation is over, the hart loses his lofty or towering horns; the birds lose much of their beauty; and the fishes a great deal of their former flavour or fine taste. Now plants are subject to the same changes: for in the spring and flowering time their verdure and beauty is most amazingly gay; but, when that is over, they lose much of their former splendor. Thus copulation weakens and debilitates. In the silk-worm, moths, and butterflies, one may see, when their copulation is over, how their wings droop, and their life expires; but if a butterfly is shut up in a room alone, and not suffered to copulate with others, it will often remain in health and vigour for half the year. In the annual and biennial plants one may observe, that before they have flowered, they resist the cold of winter, *e. g.* the Pinks, Lichnises, and others; but if they flower the first year, as soon as winter approaches they generally die; if, on the other hand, they do not flower, they will often continue in vigour three or four years. The Plantain tree has often continued in the gardens of Holland for a hundred years; but when it has once flowered, no art, skill, or experience, can prevent its lofty stem from perishing the year following. The *Corypha*, or Umbrella Palm tree, remains barren for thirty-five years, growing in that time to the height of seventy feet; and in the space of four months after that time, it rises thirty feet higher, puts forth its flowers, and produces its fruit the same year; which done, it totally dies, both root and stem. Hort. Cliff. 482. The *Lavatera Arborea*, or Sea tree Mallow, will rise to the height of a common Pear tree, bearing the winter frosts very well; but when it has once blown, though it were to produce but one flower only, not all the assistance of gardeners, or green-houses, or any art, can prevent its perishing on the first approach of winter.

The stomach of plants is the earth, from which they receive their nourishment; and the finest and most subtle part of their soil is their chyle. The root, which carries the chyle from the stomach to the body of the plant, is analogous to the lacteals or chyliferous vessels of animals. The trunk, which supports and gives strength to the whole plant, is analogous to the bones. The leaves, by which plants transpire, are instead of lungs. The leaves may be also compared to the muscles of animals; for by their agitation with the wind the plant is put in motion. For this reason, herbs

miration. But for over-hot and torrid land, you must sadden the mould about the root with pond-mud, and neats-dung; and by grafting fruit-trees on stocks raised in the same mould, as being more *homogeneous*. CH. VIII.

Hollowness is contracted, when, by reason of the ignorant or careless topping of a tree, the wet is suffered to fall perpendicularly upon a part, especially the head, or any other part or arms, by which means the rain is conducted to the very heart of the stem and body of the tree, which

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furnished with leaves cannot thrive, except they have air; but succulent plants, which have no leaves; *e. g.* some of the *Euphorbias*, Torch-thistles, Melon-thistle, Prickly-pear, and the *Stapelia*, though shut up in green-houses, and quite deprived of the external air, do thrive very well. If you shut up a tree or a shrub, which is full of leaves, in a close room in the summer-time, it will die; but if in the winter, when it has lost all its leaves, it will remain safe. Heat is to plants analogous to the heart in animals. Plants have no heart, nor indeed have they any occasion for such an organ, for they live in the same manner as Polypes do in the animal kingdom: their juices mixed with air are propelled through their vessels, but not circulated back again by returning vessels. The blood-vessels of animals are divided into various branches, so also are the vessels of plants. Plants, for the most part, have their genital organs placed at their ramifications; in the same manner animals have theirs at the ramification of the iliac vessels, with this difference however, that the ramifications of plants ascend, whereas those of animals go downwards or backward; hence the antients called a plant an inverted animal.

From what has been said it follows, that a flower, which is furnished with antheræ, but wants the stigmata, is a male flower; that a flower which has stigmata, but no antheræ, is a female; and one that has both, is an hermaphrodite flower. Nor need we wonder, that in the vegetable kingdom many plants are hermaphrodite, though in the animal kingdom there are very few of this kind; for here one sex can easily go to the other; whereas plants are fixed to one spot, and cannot go from it. Justly therefore has the All-wise Creator furnished snails and other slow-paced animals with the genital organs of both sexes, lest (seeing they rarely meet) the species should be extinct or lost; during their copulation then, the one acts on the other, and each acts the part of male and female, while both impregnate and are impregnated by each other.

We call a plant which has only male flowers, a male plant; that which has only female flowers, a female plant; and that which has only hermaphrodite flowers, an hermaphrodite plant. A fourth sort, having on one and the same stem both male and female flowers distinct, is called an androgynous plant. There is also a fifth sort, namely, when on one and the same plant there are not only hermaphrodite flowers, but also male or female flowers; and this is called a polygamous plant. When male flowers are added to the hermaphrodite, they serve to impregnate those which have not

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it soon rots. In this case, if there be sufficient sound wood, cut it to the quick, and close to the body, and cap the hollow part with a tarpaulin, or fill it with good stiff loam, horse-dung and fine hay mingled, or with well-tempered mortar, covering it with a piece of tarpaulin. This is one of the worst of evils, and to which the Elm is most obnoxious. Old broken boughs, if very great, are to be cut off at some distance from the body, but the smaller close.

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been impregnated by their own males, *e. g.* in the Cross-wort, and White Hellebore; or, if female flowers are added, they are impregnated by the farina of the hermaphrodite flowers, as in the *Pellitory* and *Orrache*. It is very remarkable, that the seeds of the hermaphrodite flowers in the *Orrache* are altogether unlike to the seeds of the female flowers both in shape and size, yet they produce the same plant, as well as the seeds of compound flowers do, which grow in the disk and in the radius, or in the center and margin of the flower. To this place we may refer a third sort of polygamous plants, in which there are two sorts of hermaphrodite flowers on one individual, one sort wanting the stigmata, and the other the antheræ, as in the Plantain tree.

When there are more petals in flowers than they ought to have, such are said to be luxuriant; and they are of three sorts, viz. Full, when all the stamina are wanting, and petals only grow in their room: Multiplied, when some of the stamina are wanting, and some remain; or Proliferous, when another flower with its proper flower-stalk grows out of the pistillum, or center of the flower. All luxuriant flowers are justly reckoned monsters, since the essential parts are changed into a different nature and figure: which, notwithstanding, is much admired by florists, who take great delight in full and multiplied flowers or double flowers, as they commonly call them. It is remarkable, that when monopetalous flowers are changed into luxuriant or full ones, only the corolla is increased, as in the Gelder Rose, African Marygold, Feverfew, &c. And this holds chiefly in compound flowers, and but seldom in any other. Hence we may see, that no full flowers are ever natural, but always propagated from single ones, for nature never produces any race of mere monsters. These full flowers are at first produced from a superabundance of nourishment. And since these full flowers are destitute of stamina, they are consequently deprived of the male organs of generation, which should impregnate the stigmata; but no seeds will germinate, (as we have observed before) unless they have been fertilized by the male dust; therefore such flowers must necessarily be barren, or produce no seeds. Of this sort are the Pinks, the *Hepatica*, Stock July-flower, Indian Crêss, Pomegranate, Rose, *Ranunculus*, Marth-marygold, *Lychnis*, Violet Wall-flower, Piony, *Narcissus*, &c. All these, with full flowers, never produce seeds, but are propagated by suckers, off-sets, or slips, *i. e.* by dividing the roots. I am well aware, that the Poppy, the Fennel flower, and some few among the compound flowers, do sometimes produce good seeds, because some of their stamina remain to impregnate the pistillum. The same way of reasoning may be applied to all proliferous flowers, *e. g.* the *Ranunculus*, Rose, *Avena*; for they are all

Hornets and wasps, by breeding in the hollowness of trees, not only infect them, but will peel them round to the very timber, as if cattle had unbarked them, as I observed in some goodly Ashes at Cassiobury, (near the garden of that late noble Lord, and lover of planting, the Earl of Essex) and are therefore to be destroyed by stopping up their entrances with tar and goose-dung, or by conveying the fumes of brimstone into their cells. Cantharides attack the Ash above all other botts of the beetle kind. Chafers, &c. are to be shaken down and crushed; and when they come in armies, (as sometimes in extraordinary droughts) they are to be driven away or destroyed with smoak, which also kills gnats and flies of all sorts. Note, that the Rose-bug never, or very seldom, attacks any other tree whilst that sweet bush is in flower. Whole fields have been freed from worms by the reek and smoak of ox-dung wrapt in mungy straw, well soaked with strong lye.

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barren, because they want the germen, and female parts of generation, when the proliferation is from the center of the flower; but their offspring sometimes produce good seeds, providing they are not full flowers.

From this dissertation the reader may perceive, how similar nature is to herself, and how exact in following her own laws in all her works. Who would ever believe so many truths were discoverable concerning plants? though, without doubt, there are many more that remain still undiscovered. I shall conclude with the words of Pliny: "That there is in plants a natural instinct to generation; and that the males, by a certain blast and subtle powder, do consummate the nuptials on the females."——
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4. AGE. No one can doubt but that every living thing has its beginning and ending, and undergoes innumerable changes. Thus we see, that infancy is weak, feeble, barren; but youth is comely, flourishing, and luxuriant; manhood is fertile, plump, strong, and of full stature; and, lastly, old age flags, droops, becomes dry, hoary, languid, the sad prefaces of its approaching dissolution. And are not plants subject to the same vicissitudes, and go through the same stages? In their infant or very youthful state they are small and weak, destitute of flowers and fruit; when more advanced, they wanton in beautiful and shining flowers, being then most agreeable, and, as it were, in the joyous spring of life; in summer, being then more plump, firm and strong, but less splendid, they bear fruit; in autumn, or old age, they droop, grow dry, and wither, returning to dust from whence they came. The Ivy in its first or tender state, has spear-shaped leaves, and bears neither flowers nor fruit. This is that variety which Bauhine calls *Hedera bumi repens*, Ivy creeping on the ground. The same plant, when more advanced, bears five-lobed leaves, climbs on trees and walls, and is barren. This variety Bauhine calls *Hedera major sterilis*, the greater barren Ivy. In

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Earwigs and snails do seldom infest forest-trees, but those which are fruit-bearers, and are destroyed by setting boards or tiles against the walls, or the placing of Neat-hoofs, or any hollow thing upon small stakes; also by enticing them into sweet waters, and by picking the snails off betimes in the morning, and rainy evenings. I advise you to visit your Cypress trees on the first rains in April; you shall sometimes find them covered with young snails no bigger than small pease. Lastly, branches, buds, and leaves extremely suffer from blasts, jaundice and caterpillars, locusts, rooks, &c. Note, that you should visit the boards, tiles, and hoofs, which you set for the retreat of those insects, in the heat of the day, to shake them out, and kill them.

The blasted parts of trees, and gum, should be cut away to the quick; and to prevent it, smoak them in suspicious weather, by burning moist straw with the wind, or rather the dry and superfluous cuttings of aromatic plants, such as Rosemary, Lavender, Juniper, Bays, &c. I use to whip

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its next or more mature state it sends forth three-lobed leaves, and, leaving its props and supporters, it rises by its own strength, and puts on the appearance of a pretty tall tree, being loaded with flowers and fruit. This is the *Hedera Arborea* of C. B. Tree Ivy. But when old, it puts forth egg-shaped leaves without lobes. This is the *Hedera Poetica* of C. B. Poets' Ivy. Daily experience abundantly shews, that all plants, as well as the Ivy, undergo the same fate. From the seed spring up tender shoots, which at first are not larger than small shrubs; then, by degrees, they acquire a firm trunk, and also bear flowers and fruit; lastly, the branches flag, and are covered, as well as the trunk, with moss, first one branch decaying, and then another, till the whole tree moulders away; and *the place thereof knoweth it no more*.

5. DISEASES. When life, in any manner of way, is hurt or injured, that state we call Disease; to which vegetables, as well as animals, are subject. By too great heat they are parched, become languid, and droop; by too much cold they are often killed, or made subject to cold tumours, analogous to kibes and chilblains in the human body. Sometimes they are liable to canker, sometimes to vermin, from whence they are said to be lousy.

6. DEATH. Death is the privation of life. Every living thing is subject to death, as constant experience teaches. Since then, we know that vegetables as well as animals die by diseases and external injuries, we may ask, How can vegetables exchange life for death, if they were not previously endued with life? For if we break a stone, which has no life, into a thousand parts, it by no means undergoes such a change as we observe in vegetables.

and chastise my Cypresses with a wand, after their winter-burnings, till all the mortified and scorched parts fly off in dust, as long almost as any will fall, and observe that they recover and spring the better. Mice, moles, and pismires cause the jaundice in trees, known by the discolour of the leaves and buds.

The moles do much hurt, by making hollow passages, which grow musty; but they may be taken in traps, and killed, as every woodman knows: It is certain that they are driven from their haunts, for a time, by garlick, and other heady smells, buried in their passages.

Mice and rats are taken with traps, or by sinking some vessel almost level with the surface of the ground, the vessel half full of water, upon which let there be strewed some hulls or chaff of oats; also with bane, powder of orpiment in milk, and aconites mixed with butter: copperas or green glass broken with honey, morsels of sponge chopped small and fried in lard, &c. are very fit baits to destroy these nimble creatures, which else soon will ruin a semination of nuts, acorns, and other kernels in a night or two, and rob the largest beds of a nursery, carrying them away by thousands to their cavernous magazines, to serve them all the winter: I have been told that Hop branches stuck about trees, preserve them from these thievish creatures.

Destroy pismires with scalding water, and disturbing their hills, or rubbing the stem with cow-dung, or a decoction of Tithymale, washing the infested parts; and this will insinuate, and chase them quite out of the chinks and crevices, without prejudice to the tree, and is a good prevention of other infirmities; also by laying foot, sea-coal, saw-dust, or refuse tobacco where they haunt, often renewed, especially after rain; for becoming moist, the dust and powder harden, and then they march over it.

Caterpillars are destroyed by cutting off their webs from the twigs before the end of February, and burning them; the sooner the better: If they be already hatched, wash them off with water, in which some of the caterpillars themselves and garlick have been bruised; the juice of rue, decoctions of coloquintida, hemp-seed, wormwood, tobacco, walnut-shells when green, with the leaves of sage, urine and ashes, make good aspersions. Take of two or three of the ingredients, of each an handful; make

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them boil in two pails of water for half an hour, then strain the liquor, and sprinkle it on the trees infected with caterpillars, the black flea, &c. in two or three times it will clear them, and should be used about the time of blossoming. Another method is to choak and dry them with smoak of galbanum, shoe-soals, and hair; and some affirm, that planting Piony near them is a certain remedy; but there is no remedy so facile as the burning them off with small wisps of dry straw, which in a moment rids you.

Rooks do in time, by pinching off the buds and tops of trees for their nests, cause many trees and groves to decay. Their dung propagates nettles and weeds, and choaks young seedlings. They are to be shot, and their nests demolished. The Bullfinch and Titmouse also eat off and spoil the buds of fruit-trees; these are prevented by clappers, or caught in the wire mouse-trap with teeth, and baited with a piece of rusty bacon; also with lime-twigs. But if cattle break in before the time, *conclamatum est*, especially goats, whose mouths and breath is poison to trees, they never thrive well after, and Varro affirms, if they but lick the Olive trees, they become immediately barren. And now we have mentioned barrenness, we do not reckon trees to be sterile, which do not yield a fruitful burden constantly every year (as Juniper and some Annotines do) no more than of pregnant women; whilst that is to be accounted a fruitful tree which yields its product every second or third year, as the Oak and most foresters do: no more may we conclude that any tree or vegetable is destitute of seeds, because we see them not so perspicuously with our naked eyes, by reason of their exility, as with the nicest examination of the microscope.

Another touch at the winds; for though they cannot properly be said to be infirmities of trees, yet they are amongst the principal causes that render trees infirm. I know no surer protection against them, than, as we said, to shelter and stake the trees whilst they are young, till they have well-established roots; and with this caution, that in case any goodly tree (which you would desire especially to preserve and redress) chance to be prostrated by some impetuous and extraordinary storm, you be not over-hasty to carry him away, or despair of him. First then, let me persuade you to poll him close, and so let him lie some time; for by this means many vast trees have raised themselves by the vigour only of the remaining roots, without any other assistance; so as people have pronounced it miraculous, as I could tell you by several instances, besides what Theo-

phrastus relates, lib. v. cap. xix. of that huge Platanus which rose in one night in his observation: And this puts me in mind of what I remember the very learned critic Palmerius affirms of an Oak, subverted by a late tempest near Breda, (where this old foldier militated under Prince Maurice, when the town was besieged by the famous Marquis Spinola) which tree, after it had lain prostrate about two months (the side-branches pared off) rose up of itself, and flourished as well as ever. Which event was thought so extraordinary, that the people reserved sprigs and boughs of it, as sacred reliques; and this he affirms to have seen himself. I take the more notice of these accidents, that none who have trees blown down; where it may cause a deformed gap in some avenue near their seats, may altogether despair of their resurrection, with patience and timely freeing them. And the like to this I find happened in more than one tree near Bononia in Italy, in 1657, when a turbulent gulf almost quite eradicated a very large tract of huge Poplars, belonging to the Marchioness Elephantucca Spada: These universally erected themselves again, after they were beheaded, though they lay even prostrate.—Pliny, the Naturalist, says, *Prostratas restitui plerumque, et quadam terræ cicatrice vivere, vulgare est. Et familiarissimum hoc Platanis; quæ plurimum ventorum concipiunt propter densitatem ramorum: quibus amputatis, levatæ onere in sua srobe reponuntur. Factumque jam est hoc in Juglandibus, Oleisque, ac multis aliis. Est in exemplis, et sine tempestate, ullæ causa alia quam prodigii, cecidisse multas ac sua sponte resurrexisse. Factum hoc Populi Rom. Quiritibus ostentum Cimbricis bellis Nucerie in luco Junonis, Ulmo, postquam etiam cacumen amputatum erat, quoniam in aram ipsam procumbebat, restituta sponte, ita ut protinus floreret: a quo deinde tempore Majestas Populi Romani resurrexit, quæ ante vastata claudibus fuerat. Memoratur hoc idem factum et in Philippis, Salice procidua atque detruncata: et Stagiris et Museo populo alba: omnia fausti ominis. Sed maxime mirum, Antandri Platanus etiam circumdolatibus lateribus restitibilis sponte facta, vitæque reddita longitudine quindecim cubitorum, crassitudine quatuor ulnarum.* Lib. xvi. cap. xxxii.

But we have farther instances than these, and so very lately as that dreadful storm happening November 26, 1703, when, after so many thousand Oaks and other timber-trees were quite subverted, a most famous and monstrous Oak, growing at Epping in Essex, (blown down) raised itself, and withstood that hurricane. These, amongst many others, are the infirmities to which forest-trees are subject whilst they are standing: and when they are felled they are liable to the worm, especially if cut before the sap

Book II. be perfectly at rest :—To prevent or cure it in the timber, I commend this secret as the most approved :

Let common yellow sulphur be put into a glass cucurbit, upon which pour so much of the strongest aqua fortis, as may cover it three fingers deep : Distil this to dryness, which is done by two or three rectifications. Let the sulphur remaining in the bottom (being of a blackish or sad red colour) be laid on a marble, or put into a glass, where it will easily dissolve into oil : With this anoint what is either infected, or to be preserved of timber. It is a great and excellent arcanum for tinging the wood with no unpleasant colour, by no art to be washed out; and such a preservative of all manner of woods, nay, of many other things, as ropes, cables, fishing nets, masts of ships, &c. that it defends them from putrefaction, either in waters under or above the earth, in the snow, ice, air, winter or summer. It were superfluous to describe the process of the aqua fortis; it shall be sufficient to let you know, that our common copperas makes this aqua fortis well enough for our purpose, being drawn over by a retort: and for sulphur, the island of St. Christopher's yields enough (which hardly needs any refining) to furnish the whole world. This secret, for the curious, I thought fit not to omit; though three or four anointings with linseed-oil has proved very effectual, and is more compendious. It was experimented in a Walnut table, where it destroyed millions of worms immediately, and is to be practised for tables, tubes, mathematical instruments, boxes, bedsteads, chairs, rarities, &c. Oil of walnuts will doubtless do the same, is sweeter, and a better varnish; but above all is commended oil of Cedar, or that of Juniper; whilst oil of Spike does the cure as effectually as any.

* 1683. But after all these sweeping plagues and destructions inflicted on trees, braving all human remedies, such frosts as not many years * since happened, left such marks of their deadly effects, not sparing the goodliest and most flourishing trees, timber, and other of the stoutest kind, as some ages will hardly repair : nay, it was observed, that the Oak in particular, counted the most valiant and sturdy of the whole forest, was more prejudiced with this excessive cold, and the drought of the year ensuing, than any of the most nice and tender constitution : always here excepting, as to an universal strages, the hurricane of Sept. 1703, which begins the epocha of the calamities which have since followed, not only by the late tempest about August last *, but by that surprizing blast, accompanied doubtless with a fiery spirit, which smote the most flourishing foresters and fruit-

* 1705.

trees, burning their buds and leaves to dust and powder, not sparing the very fruit. This being done in a moment, must be looked upon as a plague not to be prevented: In the mean time, that the malignity proceed no farther, it may be advisable to cut and top the summities of such tender mural trees, rare shrubs, &c. as have most suffered, and are within reach, rubbing off the scorchings in order to new spring.

There were, in my remembrance, certain prayers, litanies, and collects, solemnly used by the parish minister in the field, at the limits of their perambulations on the rogation days, from an antient and laudable custom of above one thousand years, introduced by Avitus, the pious Bishop of Vienna, in a great dearth, unseasonable weather, and other calamities, (however in tract of time abused by many gross superstitions and insignificant rites, in imitation of the Pagan Robigalia) upon which days, about the ascension and beginning of spring especially, prayers were made, as well deprecatory of epidemical evils, amongst which blasts and smut of corn were none of the least, as supplicatory for propitious seasons, and blessings on the fruits of the earth. Whether there was any peculiar office, besides those for Ember-weeks, appointed, I do not know; but the pious and learned Bishop of Winchester, (Andrews) has, in his devotions, left us a prayer so apposite and comprehensive for these emergencies, that I cannot forbear the recital:

Remember, O Lord, to renew the year with thy goodness, and the season with a promising temper; for the eyes of all wait upon thee, O Lord; thou givest them meat; thou openest thy hand, and fillest all things living with thy bounty. Vouchsafe therefore, O Lord, the blessings of the heavens, and the dew from above: The blessings of the springs, and the deep from beneath: The returns of the sun, the conjunctions of the moon: The benefit of the rising mountains, and the lasting hills: The fulness of the earth, and all that breed therein:

*A fruitful season,
Temperate air,
Plenty of corn,
Abundance of fruits,
Health of body, and
Peaceable times,
Good and wise government,
Prudent counsels,*

*Just laws,
Righteous judgments,
Loyal obedience,
Due execution of Justice,
Sufficient store for life,
Happy births,
Good and fair plenty,
Breeding and institution of children.*

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That our sons may grow up as the young plants, and our daughters may be as the polished corners of the temple: That our garners may be full and plenteous with all manner of store: That our sheep may bring forth thousands: That our oxen may be strong to labour: That there be no decay; no leading into captivity; no complaining in our streets: But that every man may sit under his own vine, and under his own fig-tree, in thankfulness to thee; sobriety, and charity to his neighbour; and in whatsoever other estate thou wilt have him, therewith to be contented: And this for Jesus Christ his sake, to whom be glory for ever. Amen.

Hitherto I have spoken of trees, their kinds, and propagation in particular. I shall now say a word or two concerning their ordering in general, as it relates to Coppices, Lopping, Felling, &c. After this I shall add something concerning their uses as to fuel, &c. and cast such accidental lessons into a few aphorisms as could not well be more regularly inserted. I shall next give some serious observations in reference to the main design and project of this discourse, as it concerns the improvement of his Majesty's Forests for the honour and security of the whole kingdom. And, lastly, I shall put a conclusion to this work with an historical account of the sacredness and use of **STANDING GROVES**.

DENDROLOGIA.

BOOK THE THIRD.

CHAP. I.

Of COPPICES.

CHAP. I.

SYLVA CÆDUA is (as Varro defines it) as well Coppice to cut for fuel as for use of timber; and we have already shewed how it is to be raised, both by sowing and planting. I shall only here add, that if, in their first designation, they be so laid out as to grow for several falls, they will both prove more profitable and more delightful: More profitable, because of their annual succession; and more pleasant, because there will always remain some of them standing; and if they be so cast out, as that you leave straight and even intervals of eighteen or twenty feet for grafts, between spring wood and spring wood, securely fenced and preserved, the pastures will lie both warm, and prove of exceeding delight to the owner. These spaces are likewise useful, and necessary for cartway, to fetch out the wood at every fall. There is not a more noble and worthy husbandry than is this, which rejects no sort of ground nor situation, (though facing the east is esteemed best for both timber and underwood) as we have abundantly shewed; since even the most boggy places may be so drained and cast, as to yield their increase by planting the drier sorts upon the ridges and banks which you cast up, where they will thrive exceedingly: And then Willow, Sallow, Alder, Poplar, Sycamore, Black Cherry, &c. will shoot tolerably well on the lower and more uliginous; with this caution, that for the first two years they be kept diligently weeded and cleaned, which is as necessary as fencing and guarding from cattle. Our ordinary coppices are chiefly upon Hasel, or the Birch; but if amongst the other kinds, store of Ash, (which I most prefer, for a speedy and erect growth) Chestnut, Sallow, and Sycamore, (at least one in four) were

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sprinkled in the planting, the profit would soon discover a difference, and well recompense the industry. Others advise us to plant shoots of Sallow, Willow, Alder, and all the swift-growing trees, being of seven years growth, sloping off both the ends towards the ground, to the length of a billet, and burying them a reasonable depth in the earth. This will cause them to put forth seven or eight branches, each of which will become a tree in a short time, especially if the soil be moist. The nearest distance for these plantations ought never to be less than five feet at first, since every felling renders them wider for the benefit of the timber, even to thirty and forty feet, in five or six fellings.

Though it be almost impossible for us to prescribe at what age it were best husbandry to fell copses, (as we at least call best husbandry) that is, for most and greatest gain, since the markets, and the kinds of wood, and emergent uses do so much govern; yet copses are sometimes of a competent stature after eight or nine years from the acorn; and so every eight or ten years successively, will rise better and better. But this had need be an extraordinary ground, otherwise you may do well to allow them twelve or fifteen to fit them for the ax; but those of twenty years standing are better, and far advance the price, especially if Oak, and Ash, and Chestnut be the chief furniture; and be sure you shall lose nothing by this patience, since, all accidents considered, the profit arising from copses so managed (be the ground almost never so poor) shall equal, if not exceed, what is usually made by the plow or grazing. Some of our old clergy spring-woods heretofore have been let rest till twenty-five or thirty years, and have proved highly worth the attendance; for by that time, even a seminary of acorns will render a considerable advance, as I have already exemplified in the Northamptonshire Lady. And if copses were so divided, as that every year there might be some felled, it were a continual and a present profit. Seventeen years growth affords a tolerable fell. Supposing the copse of seventeen acres, one acre might be yearly felled for ever, and so more, according to proportion: but though the seldom fall yields the more timber, yet the frequent makes the under-wood the thicker; therefore at ten or twelve years growth, says Mr. Cook, make the fall in shallow ground, and fourteen in deeper. If many timber-trees grow in your copses which are to be cut down, fell both them and the under-wood, as near the ground as may be; but this is to be understood where the wood is very thick; otherwise, it is advisable to stock up the thinner, especially in great timber, and to set in the holes Elm, Cherry, Poplar, Sallow,

Service; and so these trees, which are apt to grow from the running-root, thicken the wood exceedingly; whilst the very roots will pay for the grubbing, and yield you some feet of the best timber; whereas being let stand, nothing would have grown. If the ground be a shallow soil, forbear filling the holes quite, but set some running-wood in the loosened earth, and the ends of the old roots being cut, will furnish the sides of the holes speedily. In thin copses, it is profitable to lay some boughs athwart, which will be rooted to advantage against next fall. All rotten stubs among our under-woods should be extirpated to make way for seedlings, and young roots to spring and run: The cutting slanting, smooth and close, is of great importance; and frequent felling gives way and air to the subnascent seedlings, and the rest will make lusty shoots.

As to what numbers and scantlings you are to leave on every acre, the statutes are our general guides, at least the legal. It is a very ordinary copse which will not afford three or four firfts, that is, befts; fourteen seconds, twelve thirds, eight wavers, &c. according to which proportions the fizes of young trees in copfing are to fucceed one another. By the Statute of 35 Henry VIII. in copfes, or under-woods, felled at twenty-four years growth, there were to be left twelve standils, or stores of Oak, upon each acre; in defect of fo many Oaks, the fame number of Elms, Ash, Asp, or Beech; and they to be fuch as are of likely trees for timber, and of fuch as have been fpared at fome former felling, unlefs there were none; in which cafe they are to be *then* left, and fo to continue without felling, till they are ten inches fquare within a yard of the ground. Copfes above this growth felled, to leave twelve great Oaks; or in defect of them, other timber-trees, as above, and fo to be left for twenty years longer, and to be inclofed feven years.

In fum, you are to fpare as many likely trees for timber as with difcretion you can. In the mean time, there are fome who find it not fo profitable to permit fo many timber-trees to ftand in the heart of copfes, but on the fkirts, and near the edges, where their branches may freely fpread, and have air, without dripping and annoying the fubnascent crop: nor fhould they be fthread, which commonly makes them grow knotty. This is a note of the ingenious Mr. Nourfe.

Now as to the felling, (beginning at one fide, that the carts may enter without detriment to what you leave ftanding) the under-wood may be cut

Book III. from January, at the latest, till Mid-March or April; or from Mid-September, till near the end of November; so as all be avoided by Midsummer at the latest, and then fenced, (where the rows and brush lie longer unbound, or made up, you endanger the loss of a second spring) and not to stay so long as usually they are a-clearing, that the young and the seedlings may not suffer the least interruption; and if the winter, previous to your felling copses, you preserve them well from cattle, it will recompense your care.

It is advised not to cut off the browe-wood of Oaks in copses, but to suffer it to fall off, as where trees stand very close it usually does: I do not well comprehend why yet it should be spared so long.

When you espy a cluster of plants growing as it were all in a bunch, it shall suffice that you preserve the fairest sapling, cutting all the rest away. And if it chance to be a Chesnut, Service, or like profitable tree, clear it from the droppings and incumbrances of other trees, that it may thrive the better: Then, as you pass along, prune and trim up all the young wavers, covering such roots as lie bare and exposed, with fresh mould. There are some who direct the lopping of young Oaks at a competent distance from the stem, and that while the wounds are healing, this would advantage the under-wood; but I cannot say it would be without prejudice to the timber.

Cut not above half a foot from the ground, nay the closer the better, and that to the south, slope-wise, stripping up such as you spare from their extravagant branches, water-boughs, &c. that hinder the growth of others. Always remember (before you so much as enter upon this work) to preserve sufficient plash-pole about the verge and bounds of the copse for fence and security of what you leave; and for this, something less than a rod may suffice: Then raking your wood clear of spray, chips, and all incumbrances, shut it up from the cattle; the longer the better.

By the statute, men were bound to inclose copses after felling, of or under fourteen years growth, for four years: Those above fourteen years growth, to be sixteen years inclosed; and for woods in common, a fourth part to be shut up; and at felling, the like proportion of great trees to be left, and seven years inclosed: This was enlarged by 13 Eliz. Your elder under-woods may be grazed about July: But for a general rule,

newly-weaned calves are the least noxious to newly-cut spring-woods, where there is abundance of grafs; and some say, colts of a year old; but then the calves must be driven out at May at farthest, though the colts be permitted to stay a while longer: but of this, every man's experience will direct him; and surely, the later you admit beasts to graze, the better. For the measure of fuel, these proportions were to be observed.

Statutable billet should hold three feet in length, and seven inches and a half in compass; *ten or fourteen* as they are counted for *one, two, or three, &c.* A stack of wood (which is the boughs and offal of the trees to be converted to charcoal) is four yards long, three feet and a half high, (in some places but a yard) and as much over: In other places, the cord is four feet in height, and four feet over; or, to speak more geometrically, a solid made up of three dimensions, four feet high, four feet broad, and eight feet long; the content one hundred and twenty-eight cubic feet. Faggots ought to be a full yard in length, and two feet in circumference, made round, and not flat; for so they contain less fuel, though appearing equal in the bulk.

In the mean time, it were to be wished that some approved experiments were sedulously tried, with the advice of skilful and ingenious physicians, for the making of beer without hops; as possibly with the White Marrubium, a plant of singular virtue, or with dried Heath-tops, viz. that sort which bears no berries, or the like, far more wholesome, and less bitter than either Tamarisk, Carduus, or Broom, which divers have essayed; it might prove a means to save a world of fuel, and in divers places young timber and copse-wood, which is yearly spent for poles, especially in countries where wood is very precious*. —Note, That the woodland measure, by statute, is computed after eighteen feet the perch.

N O T E S.

* Hops were introduced, about two centuries and a half ago, from Flanders, and from that time have been assiduously cultivated in this kingdom. The duties arising from this article are so considerable, that all public brewers are enjoined under a severe penalty to use no other bitter for their malt liquors. In a year of moderate fertility, an acre of hops is supposed to produce ten hundred weight, which may be estimated at three pounds per hundred. Of this sum, one moiety goes clear into the pocket of the cultivator, and the other moiety is employed in the discharge of rent, tithe, and all other expences, except the duty by excise. It is computed that the duty, upon an average, amounts to 55,000*l.* per Ann. a sum too considerable to be lost by permitting other bitter herbs to be substituted in the place of hops.

CHAP. II.

OF PRUNING.

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THERE can nothing certainly be more necessary, in order to pruning, than the knowledge of the course and nature of the sap, which not being as yet so universally agreed on, after innumerable trials and experiments, leads our arborators into many errors and mistakes. I have in this forest-work occasionally recited the various opinions of several, leaving them to the determination of the learned and judicious, as a considerable part of natural philosophy; Dr. Grew, Malpighius, De la Quinteny, and what is found dispersed in the philosophical transactions by our plant-anatomists, without charging this chapter with repetitions. And the same I have done likewise as to astrological observations, positions of the stars, and planetary configurations, exhalations, and dominant power; though, in compliance to custom, I now and then forbear to abdicate our country planter's goddesses; contenting myself with the wholesomeness of the air we breathe in, and the goodness of the soil. I shall therefore, in the first place, speak of the manual operation of pruning, and other instructions as they afterwards occur.

PUTATIO, or Pruning, is the purgation of trees in general from what is superfluous. The ancients found such benefit in pruning, that they feigned a goddess presided over it, as Arnobius tells us: and, in truth, it is in the discreet performance of this work, that the improvement of our timber and woods does as much consist as in any thing whatsoever. A skilful planter should therefore be early at this work.

It is a misery to see how our fairest trees are defaced and mangled by unskilful wood-men, and mischievous borderers, who go always armed with short hand-bills, hacking and chopping off all that comes in their way; by which our trees are made full of knots, stubs, boils, cankers, and deformed bunches, to their utter destruction. Good husbands should be ashamed of it; tho' I would have no wood-man pretend to be without all his necessary furniture, when he goes about this work; which I, once for all, reckon to be the hand-bill, hatchet, hook, hand-saw, an excellent pruning-knife, broad chisel and mallet, all made of the best steel and kept sharp; and thus he is provided for greater, or more gentle executions,

purgations, recisions, and coercions; and it is of main concern, that the proper and effectual tool be applied to every work, since heavy and rude instruments do but mangle and bruise tender plants; and if they be too small, they cannot make clear and even work upon great arms and branches. The knife is for twigs and spray; the chisel for larger arms, and such amputations as the ax and bill cannot well operate upon. As much to be reprehended are those who either begin this work at unseasonable times, or so maim the poor branches, that either out of laziness, or want of skill, they leave most of them stubs, and instead of cutting the arms and branches close to the bole, hack them off a foot or two from the body of the tree, by which means they become hollow and rotten, and are as so many conduits to receive the rain and the weather, which conveys the wet to the very matrix and heart, deforming the whole tree with many ugly botches, which shortens its life, and utterly mars the timber: I know Sir H. Platt tells us, the Elm should be so lopped, but he says it not of his own experience, as I do. And here it is that I am, once for all, to warn our disorderly husbandmen from coveting to let their lops grow to an extraordinary size before they take them off, as conceiving it furnishes them with the more wood for the fire; not considering how such gasty wounds mortally affect the whole body of the tree, or at least do so decay their vigour, that they hereby lose more in one year than the lop amounts to, should they pare them off sooner, and when the scars might be covered: In the mean while that young Oaks prosper much in growth, by timely pruning, the industrious Mr. Cook observes; whereas some other trees, as the Hornbeam, &c. though they will bear considerable lops, when there is only the shell of the tree standing, yet it is much to its detriment, especially to the Ash, which if once it comes to take wet by this means, rarely produces more lop to any purpose; above all, if it decay in the middle, it is then fitter for the chimney, than to stand and cumber the ground: The same may be pronounced of most trees, which would not perhaps become dotards in many ages, but for this covetous barbarity and unskillful handling.

By this animadversion alone it were easy for an ingenious man to understand how trees are to be governed; which is, in a word, by sparing great lops, cutting clean, smooth and close, making the stroke upward, and with a sharp bill, so as the weight of an untractable bough do not splice and carry the bark with it, which is both dangerous and unsightly. The Oak will suffer itself to be made a Pollard; that is, to have its head quite cut

Book III. off, and it may be good for mast, if not too much pruned, but not for timber: but the Elm so treated will perish to the foot, and certainly become hollow at last, if it escape with life.

The proper season for this work is, for old trees earlier, for young later, as a little after the change in January or February; some say in December, the wind in a gentle quarter:

———Tum stringe comas, tum brachia tonde:

———Tum denique dura

Exerce imperia, et ramos compeſce fluentes. GEORGE II.

But this ought not to be too much in young fruit-trees, after they once come to form a handsome head; in which period you should but once pare them over about March, to cover the stock the sooner, if the tree be very choice. To the aged, this is plainly a renewing of their youth, and an extraordinary refreshment, if taken in time, and that their arms be not suffered to grow too great and large; in which case the member must not be amputated too near the body, but at some distance——*ne pars sincera trahatur*: and remember to cut smooth, and sloping upwards, if upright boughs, otherwise downwards; and be sure to emplaster great wounds to keep out the wet, and hasten the covering of the bark: besides, for Interlucation, remove exuberant branches, & *spisse nemorum coma*, where the boughs grow too thick and are cumbersome, to let in the sun and air. This is of great importance; and so is the sedulous taking away of suckers, water-boughs, fretters, &c. and for the benefit of tall timber, the due stripping up the branches, and rubbing off the buds to the heights you require. Yet some do totally forbear the Oak, especially if aged, observing that they much exceed in growth such as are pruned; and in truth, such trees as we would leave for shade and ornament, should be seldom cut, but the brouse-wood cherished and preserved as low towards the ground as may be, for a more venerable and solemn shade; and therefore I did much prefer the walk of Elms in St. James's Park, as it lately grew branchy, intermingling their reverend tresses, before the present trimming them up so high; especially, since I fear the remedy comes too late to save their decay (could it have been avoided) if the amputations of such over-grown parts as have been cut off, should not rather accelerate it, by exposing their large and many wounds to the injuries of the weather, which will endanger the rotting of them, beyond all that can be applied by tar, or otherwise,

to protect them. I do rather conceive their infirmities to proceed from what has not long since been abated of their large spreading branches, to accommodate with the mall; as any one may conjecture by the great impression which the wet has already made in those incurable scars, that being now multiplied, must needs the sooner impair them; the roots having likewise infinitely suffered by many disturbances about them. In all events this walk might have enjoyed its goodly canopy, with all their branchy furniture for some ages to come, for it is hardly one since first they were planted: But this defect is providently and nobly supplied by their successors the Lime trees, which will sooner accomplish their perfection, by taking away the Chestnut trees, which will else do them prejudice.

But it is now, and never till now, that those walks and ranks of trees, and other royal amenities, are sure to prosper, whilst they are entirely under the care and culture of the most industrious and knowing Mr. Wife, to whom, and to his partner Mr. London, I not only acknowledge myself particularly obliged, but the whole nation, for what they have contributed to the sweetest, most useful, and most innocent diversions of life, gardens and plantations.

One should be cautious in heading timber-trees, especially the pithy, unless where they grow very crooked; in which case abate the head with an upward slope, and cherish a leading shoot. The Beech is very tender of its head.

It is by the discreet leaving the side-boughs in convenient places, sparing the smaller, and taking away the bigger, that you may advance a tree to what determined height you desire: Thus, bring up the leader, and when you would have that spread and break out, cut off all the side-boughs, and especially at Midsummer, if you espy them breaking out. Young trees may every year be pruned, and as they grow older at longer intervals, as at three, five, seven, or sooner, that the wounds may recover, and nothing be deformed.

Evergreens do not well support to be decapitated; side-boughs they freely spare in April, and during the spring; and if you cut at first two or three inches from the body, and the next spring after close to the stem,

BOOK III. covering the wounds with wax, or well-tempered clay, the most tender may suffer such amputations without prejudice.

Note, That the side and collateral branches of the Fir cut, or broken off, spring no more; and though the tops sometimes do, yet they never prosper to beautiful and erect heads, in which consists the grace of that beautiful tree.

Another caution is, that you be sure to cut off such tender branches to the quick, which you find have been cropt by goats, or any other cattle, who leave a drivel where they bite; which not only infects the branches, but sometimes endangers the whole; the reason is, for that the natural sap's recourse to the stem, communicates the venom to all the rest, as the whole mass and habit of animal blood is by a gangrene or venereal taint.

Divers other precepts of this nature I could here enumerate, had not the great experience, faithful and accurate description how this necessary work is to be performed, set down by our countryman honest Lawfon, prevented all that the most inquisitive can suggest: The particulars are so ingenious and highly material, that you will not be displeased to read them in his own style and character. *

All ages, saith he, by rules and experience do consent to a pruning and lopping of trees; yet have not any that I know described unto us (except in dark and general words) what, or which are those superfluous boughs which we must take away; and that is the most chief end and needful point to be known in lopping: And we may well assure ourselves (as in all other arts, so in this) there is a vantage and dexterity by skill; an habit by practice out of experience, in the performance hereof, for the profit of mankind: Yet do I not know (let me speak it with patience of our cunning Arborists) any thing within the compass of human affairs so necessary, and so little regarded; not only in orchards, but also in all other timber-trees, where or whatsoever.

N O T E S.

* Lawfon's Book is intitled, *A New Orchard and Garden*; it was published in 1597. Another Edition appeared in 1623.

Now to our purpose :

How many forests and woods, wherein you shall have for one lively thriving tree, four (nay sometimes twenty-four) evil-thriving, rotten, and dying trees, even whiles they live; and instead of trees, thousands of bushes and shrubs! what rottenness! what hollowness! what dead arms! withered tops! curtailed trunks! what loads of moss! drooping boughs and dying branches shall you see every where! and those that in this sort are in a manner all unprofitable boughs, cankered arms, crooked, little, and short boals. What an infinite number of bushes, shrubs, and scrags of Hasels, Thorns, and other unprofitable wood, which might be brought by dressing to become great and goodly trees! Consider now the cause.

The lesser wood hath been spoiled with careles, unskilful, and untimely felling; and much also of the great wood. The greater trees at the first rising have filled and overladen themselves with a number of wastful boughs and suckers, which have not only drawn the sap from the boal, but also have made it knotty, and themselves, and the boal mossy, for want of dressing; whereas, if in the prime of growth, they had been taken away close, all but one top, and clean by the bulk, the strength of all the sap should have gone to the bulk, and so he would have recovered and covered his knots, and have put forth a fair, long, and straight body, for timber profitable, huge, great of bulk, and of infinite last.

If all Timber-trees were such, (will some say) How should we have crooked wood for wheels, coorbs, &c.

Ans. Dress all you can, and there will be enough crooked for those uses.

More than this, in most places they grow so thick, that neither themselves, nor earth, nor any thing under or near them can thrive; nor Sun, nor Rain, nor Air can do them, nor any thing near, or under them, any profit or comfort.

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I see a number of hags, where out of one root you shall see three or four (nay more, such is mens unskilful greediness, who, desiring many, have none good) pretty Oaks, or Ashes, fireight and tall; because the root at the first shoot gives sap amain: But if one only of them might be suffered to grow, and that well and cleanly pruned, all to his very top, what a tree should we have in time? And we see by those roots continually and plentifully springing, notwithstanding so deadly wounded, what a commodity should arise to the owner, and the commonwealth, if wood were cherished and orderly dressed. The waste boughs closely and skilfully taken away, would give us store of fences and fuel; and the bulk of the tree in time would grow of huge length and bigness: But here, methinks, I hear an unskilful Arborist say, that trees have their several forms, even by nature; the Pear, the Holly, the Asp, &c. grow long in bulk, with few and little arms: The Oak by nature broad, and such like. All this I grant: But grant me also, that there is a profitable end and use of every tree, from which if it decline, though by nature, yet man by art may, nay must, correct it. No other end of trees I never could learn, than good timber, fruit much and good, and pleasure: Uses physical hinder nothing a good form.

Neither let any man ever so much as think, that it is unprofitable, much less impossible, to reform any tree of what kind soever: For, believe me, I have tried it: I can bring any tree (beginning betime) to any form. The Pear and Holly may be made to spread, and the Oak to close.

Thus far the good man out of his eight and forty years experience concerning timber-trees: He descends then to the orchards; which, because it may likewise be acceptable to our industrious planter, I thus contract.

“Such as stand for fruits should be parted from within two feet, or thereabouts, of the earth; so high, as to give liberty to dress the root, and no higher; because of exhausting the sap that should feed his fruit; for the

bole will be first, and best served and fed, being next to the root, and of greatest substance. These should be parted in two, three, or four arms, as your grafts yield twigs; and every arm into two or more branches, every branch into his several cyons; still spreading by equal degrees, so as his lowest spray be hardly without the reach of a man's hand, and his highest not past two yards higher: That no twig (especially in the midst) touch his fellow; let him spread as far as his lift, without any master-bough, or top, equally; and when any fall lower than his fellows, (as they will with weight of fruit) ease him the next spring of his superfluous twigs, and he will rise: When any mount above the rest, top him with a nip between your fingers, or with a knife: Thus reform any cyon; and as your tree grows in stature and strength, so let him rise with his tops but slowly and easily, especially in the midst, and equally in breadth also, following him upward, with lopping his under-growth and water-boughs, keeping the same distance of two yards, not above three in any wise, betwixt the lowest and highest twigs.

“ Thus shall you have handsome, clear, healthful, great, and lasting trees..

“ Thus will they grow safe from winds, yet the top spreading.

“ Thus shall they bear much fruit; I dare say, one as much as five of our common trees, all his branches laden.

“ Thus shall your bole, being low, defraud the branches but little of their sap.

“ Thus shall your trees be easy to dress, and as easy to gather the fruit from, without bruising the cyons, &c.”

The fittest time of the moon for the pruning is (as of grafting) when the sap is ready to stir, not proudly stirring, and so to cover the wound; and here, for the time of day, we may take Columella, *frondem medio die arborator ne cedito*, Lib. xi. Old trees should be pruned before young plants; and note, that wheresoever you take any thing away, the sap the next summer will be putting; be sure therefore when he puts to bud in any unfit place, you rub it off with your finger; and if this be done for three or four years at Midsummer, it will at last wholly clear the side-boughs,

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and exalt the growth of the stem exceedingly; and this is of good use for Elms, and such trees as are continually putting forth where they have been pruned. Thus begin timely with your trees, and you may bring them to what form you please. If you desire any tree should be taller, let him break or divide higher: This for young trees. The old are reformed by curing of their diseases, of which we have already discoursed. There is this only to be considered, in reference to foresters, out of what he has spoken concerning fruit-trees; that (as has been touched) where trees are planted for shadow and mere ornament, as in walks and avenues, the Brouse-wood, as they call it, should most of it be cherished; whereas in fruit and timber-trees, Oak excepted, it is best to free them of it. As for Pollards, (to which I am no great friend, because it makes so many scrags and dwarfs of many trees, which would else be good timber, endangering them with drips, and the like injuries) they should not be headed above once in ten or twelve years, at the beginning of the spring, or end of the fall: And Note, that all coppicing and cutting close invigorates the roots and the stem of whatsoever grows weak and unkindly; but you must then take care it be not overgrown with weeds or grass. Nothing, says my Lord Bacon, (Exper. 586) causes trees to last so long, as the frequent cutting; every such diminution is a re-invigoration of the plant's juice, so that it neither goes too far, nor rises too faintly, when it is timely refreshed with this remedy; and therefore we see that the most antient trees in church-yards, and about old buildings, are either Pollards or Dotards, seldom arising to their full altitude. It is true, as Mr. Nourse observes, that Elm and Oak frequently pollarded and cut, hindering their mounting, increases the bulk and circumference, and makes a shew of substance, when all the while it is but a hollow trunk, filled with its own corruption, spending the genuine moisture which should go to the growth of the arms and head, and interior substance of useful timber.

For the improvement of the speedy growth of trees, there is not a more excellent thing than the frequent rubbing of the bole or stem with some piece of hair-cloth, or ruder stuff, at the beginning of spring: Some I have known done with seal's skin; the more rugged bark with a piece of coat of mail, which is made of small wires: This done when the body of the tree is wet, as after a soaking rain, yet so as not to excorticate, or gall the tree, has exceedingly accelerated its growth (I am assured, to a wonderful and incredible improvement) by opening the pores, freeing them of moss, and killing the worm.

Lastly, frondation, or the taking off some of the luxuriant branches and sprays of such trees, especially whose leaves are profitable for cattle, is a kind of pruning: and so is the scarrifying and cross hatching of some fruit-bearers, and others, to abate that *φυλλομανία*, which spends all the juice in the leaves, to the prejudice of the rest of the parts.

But after all this, let us hear what the learned and experienced 'Squire Brotherton has observed upon this article of pruning, and particularly of the taking off the top: That those trees which were so used, some years before the severe frost of 1684, died; those not so pruned, escaped: And of other trees (having but a small head left) the rest of the boughs cleared, the tops flourished, and the loose branches shread perished, and the unpruned escaped: Moreover, when the like pruning was tried on trees twenty feet high, the difference of the increase was visible the following summer; but within seven or eight years time the difference was exceeding great, and even prodigious, both in bark and branch, beyond those trees that had been pruned.

This, and the like, belonging to the care of the Wood-ward, will mind him of his continual duty; which is to walk about and survey his young plantations daily; and to see that all gaps be immediately stopped; trespassing cattle impounded; and (where they are infested) the deer chased out, &c. It is most certain that trees, preserved and governed by this discipline, and according to the rules mentioned, would increase the beauty of forests, and value of timber, more in ten or twelve years, than all other imaginable plantations (accompanied with our usual neglect) can do in forty or fifty.

To conclude: In the time of this work, our ingenious Arborator should frequently incorporate, mingle, and unite the arms and branches of some young and flexible trees, which grow in consort, and near to one another, by entering them into their mutual barks with a convenient incision: this, especially about fields and hedge-rows, for fence and ornament. Dr. Plot mentions some that do naturally, or rather indeed accidentally, mingle thus; nay, and so embrace and coalesce, as if they issued out of the bowels of one another: Such are two Beeches in the way from Oxford to Reading at Cain-End; the bodies of which trees springing from different roots, after they have ascended parallel to the top, strangely unite together a great height from the ground, a transverse piece of timber entering at each end the

BOOK III.

bodies of the trees, and growing jointly with them: The same is seen in Sycamores at New-College Gardens. I myself have woven young Ash-poles into twists of three and four braids, like women's hair, when they make it up to fillet it under their coifs, which have strangely incorporated and grown together without separation; but these are rather for curiosity, than of advantage for timber.

Trees will likewise grow frequently out of the bole of the other; and some roots will penetrate through the whole length of the trunk, till, fastening in the very earth, they burst the including tree, as it has happened in Willows, where an Ash tree has sprung likely from some key or feed dropt upon the rotten head of it: But this accident not so properly pertaining to this chapter, I conclude with recommending the bowing and bending of young timber-trees, especially Oak and Ash, into various flexures, curbs, and postures, which may be done by humbling and binding them down with tough bands and withs, or hooks rather, cut skrew-wise, or slightly haggled and indented with a knife, and so skrewed into the ground, or by hanging of weighty stones to the tops, or branches, till the tenor of the sap, and custom of being so constrained, do render them apt to grow so of themselves, without power of redressing. This course would wonderfully accommodate materials for knee-timber and shipping, the wheel-wright, and other uses; conform it to their moulds, save infinite labour, and abbreviate the work of hewing and waste:

————— adeo in teneris consuefcere multum est.

Virgil, it seems, knew it well, and for what purpose:

Continuò in filvis magna vi flexa domatur

In burim, et curvi formam accipit Ulmus aratri. GEORG. ii.

When in the woods with mighty force they bow
The Elm, and shape it to the crooked plow.

CHAP. III.

Of the AGE, STATURE, and FELLING of TREES.

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AGE.

THE age of trees, except of the Coniferous, (for the most part known by the degrees of their tapering branches) is vulgarly reckoned by the number of solar revolutions, or circles; the former bark being digested and compacted into a lignous and woody substance, is annually invested by a succeeding bark, which yet in some trees is not finished so soon as in others, as we find in the Oak, Elm, Pine, Plumb-tree, &c. which exceed one another in growth, however co-equal in years: But of this hereafter. In the mean time, it is not till a tree is arrived to his perfect age and full vigour, that the Lord of the forest should consult or determine concerning a felling; for there is certainly in trees, as in all things else, a time of increment or growth; a status or season when they are at best, (which is also that of felling) and a decrement or period when they decay. To the first of these they proceed with more or less velocity, as they consist of more strict and compacted particles, or are of a slighter and more lax contexture, by which they receive a speedier or slower defluxion of aliment. This is apparent in Box and Willow; the one of a harder, the other of a more tender substance; but as they proceed, so they likewise continue. By the state of trees I would signify their utmost effort, growth, and maturity, which are all of them different as to time and kind; yet do not I intend by this any period or instant in which they do not continually either improve or decay, (the end of one being still the beginning of the other) but farther than which their natures do not extend; but immediately (though to our senses imperceptible) through some infirmity (to which all sublunary things are obnoxious) dwindle and impair, either through age, defect of nourishment, by sickness, and decay of principal parts; but especially, and more inevitably, when violently invaded by mortal and incurable infirmities, or by what other extinction of their vegetative heat, subtraction or obstruction of air and moisture; which making all motions whatsoever to cease and determine, is the cause of their final destruction.

Our honest countryman, to whose experience we have been obliged for something I have lately animadverted concerning the pruning of trees,

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does, in another chapter of the same treatise, speak of the age of trees. The discourse is both learned, rational, and full of encouragement; for he does not scruple to affirm, that even some fruit-trees may possibly arrive to a thousand years of age; and if so fruit-trees, (whose continual bearing does so much impair and shorten their lives, as we see it does their form and beauty,) how much longer might we reasonably imagine some hardy and slow-growing forest-trees may probably last? I remember Pliny tells us of some Oaks growing in his time in the * Hercynian forest, which were thought coevous with the world itself; their roots had even raised mountains, and where they encountered, swelled into goodly arches like the gates of a city: But our more modern author's calculation for fruit-trees, (I suppose he means pears, apples, &c.) his allowance is three hundred years for growth, as much as for their stand, as he terms it, and three hundred for their decay, which does in the total amount to no less than nine hundred years. This conjecture is deduced from Apple trees growing in his orchard, which having known for forty years, and upon diligent enquiry of sundry aged persons, of eighty years and more, who remembered them trees all their time, he finds, by comparing their growth with others of that kind, to be far short in bigness and perfection, viz. by more than two parts of three, yea, albeit those other trees have been much hindered in their stature through ill government and misordering: And this to me seems not at all extravagant, since I find mention of a Pear tree near Ross, in Herefordshire, which being of no less than eighteen feet in circumference, and yielding seven hogsheds of cyder yearly, must needs have been of very long standing and age, though perhaps not so near Methusalem's.

To establish this, he assembles many arguments from the age of animals, whose state and decay double the time of their increase by the same proportion. "If then (saith he) those frail creatures, whose bodies are nothing in a manner but a tender rottenness, may live to that age, I see not but a tree of a solid substance, not damaged by heat or cold, capable of, and subject to any kind of ordering or dressing, feeding naturally, and from the beginning disburthened of all superfluities, eased of, and of

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* *Hercyniæ Silvæ roborum vastitas intacta ævis, & congenita mundo, prope immortalis sorte miracula excedit. Constat attolli colles occurfantium inter se radicum repercussu: aut ubi secuta tellus non sit, arcus ad ramos usque, et ipsos inter se rixantes, curvari portarum patentium modo; ut turmas equitum transmittant.* Plin. l. xvi. c. ii.

his own accord avoiding the causes that may annoy him, should exceed the life of other creatures by very many years. What else are trees in comparison with the earth, but as hairs to the body of man? And it is certain, that (without some distemper, or forcible cause) the hairs dure with the body, and are esteemed excrements but from their superfluous growth." So as he resolves, upon good reason, that fruit-trees well ordered may live a thousand years and bear fruit; and the longer the more, the greater and the better; (for which an instance also in Dr. Beal's Herefordshire Orchards, p. 21, 22.) because his vigor is proud and stronger when his years are many. "Thus you shall see old trees put forth their buds and blossoms both sooner, and more plentifully than young trees by much; and I sensibly perceive my young trees to enlarge their fruit as they grow greater. And if fruit-trees continue to this age, how many ages is it to be supposed strong and huge timber-trees will last; whose massy bodies require the years of divers Methusalahs, before they determine their days; whose sap is strong and bitter; whose bark is hard and thick, and their substance solid and stiff; all which are defences of health and long life? Their strength withstands all forcible winds; their sap of that quality is not subject to worms and tainting; their bark receives seldom or never by casualty any wound; and not only so, but they are free from removals, which are the death of millions of trees; whereas the fruit-tree, in comparison, is little, and frequently blown down; his sap sweet, easily and soon tainted; his bark tender, and soon wounded; and himself used by man as man uses himself; that is, either unskilfully or carelessly." Thus he. But Vossius de Theolog. Gent. lib. v. cap. v. gives too little age to *Ashes* when he speaks but of one hundred years, (in which, as in the rest, he seems to agree with my Lord Bacon, *Hist. Vitæ et Mort. Art. i.*) and to the *Medica*, *Pyrus*, *Prunus*, *Cornus*, but sixty. He had as good have held his peace; even *Rosemary* has lasted amongst us a hundred years.

I might to this add much more, and truly with sufficient probability, that timber-trees (especially such as be of a compact, resinous, or balsamical nature, of which kind are the *Yew*, *Box*, *Hornbeam*, *White Thorn*, *Oak*, *Walnut*, *Cedar*, *Juniper*, &c.) are capable of very long duration and continuance. Those of largest roots, (a sign of age) are longer lived than the shorter; the dry than the wet; and the gummy, than the watery; the sterile, than the fruitful: I do not conclude from

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Pliny's Hercynian Oaks, or the Turpentine tree of Idumæa, which Josephus ranks also with the creation. I mentioned a Cypress, yet remaining somewhere in Persia near an old sepulchre, whose stem is as large as five men can encompass, the boughs extending fifteen paces every way; this must needs be a very old tree, believed by my author little less than two thousand five hundred years of age. Of such another, Dr. Spon, in his voyage into Greece, speaks, which by its spreading seems to be of the Savine kind; and, in truth, as to the age and duration, Cypress, Cedar, Box, Ebony, Brasil, and other exceeding hard and compact (with some resinous) woods, growing chiefly in both East and West-Indies, must needs be of wonderful age. The particulars were too long to recount of the old Platanus set by Agamemnon, mentioned by Theophrastus, the Herculean Oaks, the Laurel near Hippocrene, the Vatican Ilex, and the Vine which was grown to that bulk and woodiness as to make a statue of Jupiter, and columns in Juno's temple; at present it is found that the great doors of the cathedral at Ravenna are made of such Vine-tree planks, some of which are twelve feet long, and fifteen inches broad, the whole soil of that country producing Vines of prodigious growth. Such another, in Margiana, is spoken of by Strabo, that was twelve feet in circumference. Pliny mentions one of six hundred years old in his time; and at Ecoan, the late Duke of Montmorancy's House, is a table of a very large dimension, made of the like plant; and that which renders it the more strange, is, that a tree growing in such a wreathed and twisted manner, rather like a rope than timber, and needing the support of others, should arrive to such a bulk and firm consistence; but so it is, and Olearius affirms, that he found many Vines near the Caspian Sea, whose trunks were as big about as a man. And the old Lotus-trees, recorded by Valerius Maximus, and the Quercus Mariana, celebrated by the Prince of Orators, Pliny's huge Larix, and what grew in the Fortunatè Islands, with that enormous tree Scaliger reports was growing in the Troglodytie India, were famous for their age. St. Hierom affirms he saw the Sycamore that Zaccheus climbed up to behold our Lord ride in triumph to Jerusalem: But that's nothing for age to the Olive under which our blessed Saviour agonized, still remaining, as they say, in the garden to which he used to resort. At the same rate, Surius tells of other Olive trees at Nazareth, and of the cursed Fig-tree, whose stump was remaining above fifteen hundred years. Not to omit that other Fig-tree, yet standing near Cairo, which is said to have opened in two parts to receive and protect the blessed Virgin and holy Babe, as she was flying into Egypt; but is

now shewed whole again, as Monconys, who saw it, but believed nothing of it, tells the story. There is yet there a tree of the same kind, which measures seventeen paces in circumference. And now in the Aventine Mount they shew us the *Malus Medica*, planted by the hand of St. Dominic, and another in the monastery at Fundi, where Thomas Aquinas lived, planted by that Saint, 1278. In Congo they speak of trees capable to be excavated into vessels, that would contain two hundred men a-piece. To which add those superannuated *Tilias* now at Basil, and that of Aupurg, under whose prodigious shade they so often feast, and celebrate their weddings; because they are all of them noted for their reverend antiquity, that of Basil branching out one hundred paces diameter, from a stem of about twenty feet in circle, under which the German Emperors have sometimes eaten; and to such trees it seems they paid divine honours, as the nearest emblems of eternity, *et tanquam sacras ex vetustate*, as Quintilian speaks. And like to these might that Cypress be which is celebrated by Virgil, near to another monument.

But we will spare our reader, and refer him that has a desire to multiply examples of this kind, to those undoubted records our Naturalist mentions in lib. xvi. chap. xlv. where he shall read of Scipio Africanus's Olive trees; Diana's Lotus; the Ruminal Fig tree, under which the bitch wolf suckled the founder of Rome and his brother, lasting (as Tacitus calculated) eight hundred and forty years, putting out new shoots, and presaging the translation of that Empire from the Cæsarian line, happening in Nero's reign: The *Ilex*, of prodigious antiquity, as the Hetruscan Inscription remaining on it imported: But Pausanias, in his *Arcadics*, thinks the Samian *Vitex*, of which already, to be one of the oldest trees growing, and the Platan set by Menelaus: to these he adds the Delian Palm, co-eval with Apollo himself, and the Olive planted by Minerva, according to their tradition; the over-grown Myrtle; the Vatican and Tiburtine Holm, and especially that near to Tusculum, whose body was thirty-five feet about; besides divers others which he there enumerates in a large chapter. And what shall we conjecture of the age of Xerxes's Platanus, in admiration whereof he staid the march of so many hundred thousand men for so many days, by which the wise Socrates was used to swear. And certainly a goodly tree was a powerful attractive, when that prudent Consul, Passienus Crispus, fell in love with a prodigious Beech of a wonderful age and stature (which he used to sleep under, and would sometimes refresh it with pouring wine at the roots) and that wise Prince

BOOK III. Francis I. with an huge Oak, which he caused to be so curiously immured at Bourges.

STATURE. We have already made mention of Tiberius's Larch, intended to be employed about the Naumachia, which being one hundred and twenty feet in length, bare two feet diameter all that space, (not counting the top) and was looked upon as such a wonder, that though it was brought to Rome to be used in that vast fabrick, the Emperor would have it kept *propter miraculum*; and so it lay unemployed till Nero built his Amphitheatre. To this might be added the mast of Demetrius's Galeasse, which consisted but of one Cedar; and that of the float which wasted Caligula's obelisks out of Egypt, four fathoms in circumference. We read of a Cedar growing in the Island of Cyprus, which was one hundred and thirty feet long, and eighteen in diameter; and such it seems there are some yet growing on Mount Libanus, (though very few in number) one of which our late traveller, Mr. Maundrel †, affirms himself to have measured of twelve yards six inches in girth, sound, and no less than thirty yards from the ground divided into five limbs, each of which was equal to a great tree. We read also of the Plane in Athens, whose roots extended thirty-six cubits farther than the boughs, which were yet exceedingly large; and such another was that most famous tree at Veliternus, whose arms stretched out eighty feet from the stem; but these trees were solid. Let us calculate from the hollow. Besides those mentioned by Pliny, in the Hercynian Forest, the Germans had castles in Oaks, and (as now the Indians) some punti or canoes of excavated Oak, which would well contain thirty, some forty persons. Such were the antient *μονοξύλα*, in use yet about Cephalonia, as Sir George Wheeler observed; and such the *Ἀδρυα Παοία* used by those of Cyprus. But what were these to a canoe in Congo, which was made to hold two hundred men? And the Lician Platanus, recorded by the Naturalist as remaining in his days, had a room in it of eighty-one feet in compass, adorned with fountains, stately seats, and tables of stone, for it seems it was so glorious a tree both in body and head, that Licinius Mutianus (three times consul and governor of that province) used to feast his whole retinue in it, choosing rather to lodge in it than in his golden-roofed palace*. And of later date, that vast Cerrus in which an Eremite

† Maundrel's
Journey to
Jerusalem,
p. 140.

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* The Editors of the fourth and fifth Editions of the *SILVA* have rendered this sentence quite unintelligible, by concluding it with the following words: "it (*meaning the tree*) was in compass eighty feet, and grew in Asia." A thing impossible, as the

built his cell and chapel, so celebrated by the noble Fracaſtorius in his Poem *Malteide*. Cant. viii. CHAP. III.

But for theſe capacious hollow trees we need go no farther than our own country; there being, beſides that which I mention in Glouceſterſhire, an Oak at Kidlington-Green in Oxfordſhire, which has been frequently uſed (before the death of the late Judge Morton, near whoſe houſe it ſtood) for the immediate imprifonment of vagabonds and male-factors, till they could conveniently be removed to the county gaol: And ſuch another priſon Dr. Plot does, in his excellent hiſtory of Oxfordſhire, mention out of Ferdinand Hértado in Moravia, to be made out of the trunk of a Willow, twenty-seven feet in compaſs. But not to go out of our promiſed bounds, the learned Doctör ſpeaks of an Elm growing on Blechington-Green, which gave reception and harbour to a poor great-bellied woman, whom the unhoſpitable people would not receive into their houſes, who was brought to-bed in it of a ſon, now a luſty young fellow. This puts me in mind of that (I know not what to call it) privilege belonging to a venerable Oak, lately growing in Knoll-Wood, near Trely-Caſtle in Staffordſhire, of which, I think, Sir Charles Skrymſher is owner; that upon oath made of a baſtard's being begotten within the reach of the ſhade of its boughs, (which I aſſure you at the riſing and declining of the ſun is very ample) the offence was not obnoxious to the censure of either eccleſiaſtical or civil magiſtrate. Theſe, with our hiſtorian, I rather mention for their extravagant uſe, and to reſreſh the reader with ſome variety, than for their extraordinary capacity; becauſe ſuch inſtances were innumerable, ſhould we pretend to illuſtrate this particular with more than needs.

And now I have ſpoken of Elms, and other extravagancies of trees, there ſtands one (as this curious obſerver notes) in Binſey Common, fix yards in diameter next the ground, which it is conjectured has been ſo im-

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circumference of the *room* is deſcribed to be eighty-one feet. Indeed Mr. Evelyn himſelf ſeems, in his uſual manner, to have quoted this hiſtorical paſſage from memory, otherwiſe he would not have deſcribed the room as containing *fountains*, for which he has not the leaſt authority. Pliny's own deſcription of this wonderful tree is too abſurd to gain the ſmalleſt degree of credit, unleſs we ſuppoſe (what has frequently happened) that an error has been committed in tranſcribing the numerical letters from the antient manuſcripts. Vide Plin. Hiſt. Nat. Lib. xii. c. i. Ed. Harduin. Vol. I. p. 655.

BOOK III. proved by raising an earthen bank, or seat about it, which has caused it to
 { put forth into spurs, it not being so considerable in the higher trunk.

Compare me then with these that nine-fathomed-deep tree spoken of by Josephus Acosta: the Mastick tree, seen and measured by Sir Francis Drake, which was four and thirty yards in circuit; those of Nicaragua and Gambia, which seventeen persons could hardly embrace: Among these may come in the Cotton tree described by Dampier. In India, says Pliny, *Arbores tantæ proceritatis traduntur, ut sagittis superjaci nequeant* (and adds, which I think material, and therefore add also) *Hæc facit ubertas soli, temperies cæli, & aquarum abundantia*. Such were those trees in Corsica, and near Memphis, recorded by Theophrastus, &c. and for prodigious height, the two and three hundred feet unparalleled Palms Royal described by Capt. Ligon, growing in our plantations of the Barbadoes; or those goodly masts of Fir, which I have seen and measured, brought from New England; and what Bembus relates of those twenty-fathomed Antarctic trees; or those of which Cardan writes, called Ciba, which rising in their several stems each of twenty feet in compass, and as far distant each from other, unite in the bole at fifteen feet height from the ground, composing three stately arches, and thence ascending in a shaft of prodigious bulk and altitude. Such trees of thirty-seven feet diameter, an incredible thing, Scaliger (his antagonist) speaks of *ad Gambraë fluvium*. Matthioli mentions a tree growing in the Island of Cyprus, which contained one hundred and thirty feet high sound timber: And upon Mount Ætna in Sicily, is a place called by them *Ire Castayne*, from three Chestnut trees there standing, where in the cavity of one, yet remaining, a considerable flock of sheep is commonly folded. Kircher's words are these, as seen by himself: *Et quod forsan παράδοξον videri possit, ostendit mihi viæ dux, unius Castaneæ Corticem tantæ amplitudinis, ut intra eam integer pecorum grex à pastoribus, tanquam in Caula commodissima, noctu includeretur*. China Illust. p. 185. But this, as I remember, was lately ruined by the direful conflagration about Cattanea*.

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* The eruption of Mount Ætna that, in the year 1669, overwhelmed the city of Cattanea, did not destroy any of these memorable Chestnut trees, as Mr. Evelyn supposes. They are still in being, and frequently visited by the curious and enterprising Traveller. In the year 1770 Mr. Brydone made an accurate examination of them, and in an elegant history of his travels, intitled *A Tour through Sicily and Malta*, has favoured us with the following account:

“ From this place, it is not less than five or six miles to the great Chestnut trees, “ through forests growing out of the lava, in several places almost impassable. Of

And what may we conceive of those trees in the Indies, one of whose nuts hardly one man is able to carry; and which are so vast, as they depend not, like other fruit, by a stalk from the boughs, but are produced out of the very body and stem of the tree, and are sufficient to feed twenty persons at a meal? There were trees found in Brazil, that sixteen men could hardly fathom about; and the Jesuits caused one of these to be felled, for being superstitiously worshipped by the savages, which was one hundred and twenty feet in circumference. The Mexican Emperor is said to have had a tree in his garden, under whose shade a thousand men might sit at a competent distance.

We read of a certain Fig in the Caribbee Islands, which emits such large buttresses, that great planks for tables and flooring are cleft out of them, without the least prejudice to the tree; and that one of these does easily shelter two hundred men under them: And in Nieuhoff's Voyage to the East-Indies, of the *Kynti*, a kind of Oak, which yield planks of four feet breadth, and forty in length. Strabo, I remember, Geog. lib. xv. talks

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“ these trees there are many of an enormous size; but the *Castagno de Cento Cavalli* is
 “ by much the most celebrated. I have even found it marked in an old map of Sicily,
 “ published near an hundred years ago; and in all the maps of *Ætna*, and its environs,
 “ it makes a very conspicuous figure. I own I was by no means struck with its ap-
 “ pearance, as it does not seem to be one tree, but a bush of five large trees growing
 “ together. We complained to our guides of the imposition; when they unanimously
 “ assured us, that by the universal tradition and even testimony of the country, all
 “ these were once united in one stem; that their grandfathers remembered this, when
 “ it was looked upon as the glory of the forest, and visited from all quarters; that for
 “ many years past it had been reduced to the venerable ruin we beheld. We began to
 “ examine it with more attention, and found that there is an appearance that these five
 “ trees were really once united in one. The opening in the middle is at present
 “ prodigious; and it does indeed require faith to believe, that so vast a space was once
 “ occupied by solid timber.—But there is no appearance of bark on the inside of any
 “ of the stumps, nor on the sides that are opposite to one another. Mr. Glover and
 “ I measured it separately, and brought it exactly to the same size, viz. two hundred
 “ and four feet round. If this was once united in one solid stem, it must with justice
 “ indeed have been looked upon as a very wonderful phenomenon in the vegetable
 “ world, and deservedly stiled the glory of the forest.

“ I have since been told by the *Cannonico Recupero*, an ingenious ecclesiastic of
 “ this place, that he was at the expence of carrying up peasants with tools to dig round
 “ the *Castagno de Cento Cavalli*, and he assures me, upon his honour, that he found all

Book III. of fifty horsemen under a tree in India: His words are, ὡς δ' ὅφ' ἐν δένδρῳ
 μεσημερίῳ παλαιότατος πεντήκοντα; and of another that shaded five
 stadia at once; and in another place of a Pine about Ida, which measured
 twenty-four feet diameter, and of a monstrous height: To these may be
 added the *Arbor de Rays*, a certain tree growing in the East-Indies, which
 propagates itself into a vast forest (if not hindered) by shooting up, and
 then letting a kind of gummy string to fall and drivel from its branches,
 which takes root in the ground again, and in this process spreads a vast
 circuit, the single stem of some of which are reported to be no less than
 fifty feet diameter, a thing almost incredible. To this may be added the
Balete, described by Mr. Ray, (Append. vol. III.) and what he cites of
 Melchion Barros, who found trees proof against weapons, resisting the
 force of any edged tool, being of a consiture so hard: But even this, and
 all we have hitherto produced, is nothing to what I find mentioned in the
 late Chinese History, (as it is set forth upon occasion of the Dutch Em-
 bassy) where they tell us of a certain tree called *Ciennich*, (or the tree of a
 thousand years) in the province of *Sachu*, near the city of *Kien*, which is

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“ these stems united below ground in one root. I alledged that so extraordinary an ob-
 “ ject must have been celebrated by many of their writers.—He told me that it had,
 “ and produced several examples; Philoteo, Carrera, and some others. Carrera begs
 “ to be excused from telling its dimensions, but he says, he is sure there was wood
 “ enough in that one tree to build a large palace. Their poet Bagolini too has celebra-
 “ ted a tree of the same kind, perhaps the same tree*; and Massa, one of their most
 “ esteemed authors, says he has seen solid Oaks upwards of forty feet round; but
 “ adds, that the size of the Chestnut trees was beyond belief, the hollow of one of
 “ which, he says, contained three hundred sheep, and thirty people had often been in
 “ it on horseback. I shall not pretend to say, that this is the same tree he means; or
 “ whether it ever was one tree or not. There are many others that are well deserving
 “ the curiosity of travellers. One of these, about a mile and a half higher on the moun-
 “ tain, is called *Il Castagno del Galea*; it rises from one solid stem to a considerable
 “ height, after which it branches out, and is a much finer object than the other. I
 “ measured it about two feet from the ground; it was seventy-six feet round. There
 “ is a third called *Il Castagno del Nave*, that is pretty nearly of the same size. All
 “ these grow on a thick rich soil, formed originally, I believe, of ashes thrown out
 “ by the mountain.”

* Supremos inter montes monstruosior omni

Monstruosi fetum stipitis Etna dedit.

Castaneam genuit, cujus modo concava cortex

Turmam equitum haud parvam continet, atque greges, &c.

to prodigiously large, as to shroud two hundred sheep under one only branch of it, without being so much as perceived by those who approach it. And to conclude with yet a greater wonder, of another in the province of *Chekiang*, whose amplitude is so stupendously vast, as fourscore persons can hardly embrace: These gigantick trees, the Chinese timber merchants transport on floats, upon which they build huts and little cottages, where they live with their families, floating many thousand miles till all be sold, as *Le Compte* tells us. In the mean time we must not omit the strange and incredible bulk of some Oaks standing lately in *Westphalia*, whereof one served both for a castle and fort; and another there, which contained in height one hundred and thirty feet, and, as some report, thirty feet diameter; also another which yielded one hundred wane-load. I have read of a table of Walnut tree, to be seen at *St. Nicholas's* in *Lorraine*, which held twenty-five feet broad, all of a piece, and of competent length and thickness, rarely flecked and watered: *Scamozzi* the Architect reports he saw it. Such a monster that might be, under which the Emperor *Frederick III.* held his magnificent feast in 1472. For in this recension we will endeavour to give a taste of more fresh observations, and to compare our modern timber with the antient, and that, not only abroad, but without travelling into foreign countries for these wonders.

What goodly trees were of old adored, and consecrated by the Druids, I leave to conjecture from the stories of our antient Britains, who, had they left records of their prodigies in this kind, would doubtless have furnished us with examples as remarkable for the growth and stature of trees, as any which we have deduced from the writers of foreign countries; since the remains of what are yet in being (notwithstanding the havock which has universally been made, and the little care to improve our woods) may stand in fair competition with any thing that antiquity can produce.

There is somewhere in *Wales* an inscription extant, cut into the wood of an old beam, thus:

SEXAGINTA PEDES FUERANT IN STIPITE NOSTRO,
EXCEPTA COMA QUÆ SPECIOSA FUIT.

This must needs have been a noble tree, but not without later parallels; for to instance in the several species, and speak first of the bulks of some immense trees, there was standing an old and decayed Chestnut at *Fraiting*

Book III. in-Essex, whose very stump did yield thirty sizable load of logs. I could produce you another of the same kind in Gloucestershire, which contains within the bowels of it a pretty wainscotted room enlightened with windows, and furnished with seats, &c. to answer the Lycian Platanus lately mentioned.

But whilst I am on this period, see what a Tilia that most learned and obliging person Sir Thomas Brown, of Norwich, describes to me in a letter just now received.

“An extraordinary large and stately Tilia, Linden, or Lime tree, there groweth at Depeham, in Norfolk, ten miles from Norwich, whose measure is this: The compass, in the least part of the trunk or body, about two yards from the ground, is at least eight yards and a half; about the root near the earth, sixteen yards; about half a yard above that, near twelve yards in circuit; the height to the uppermost boughs about thirty yards. This surmounts the famous Tilia of Zurich, in Switzerland; and uncertain it is whether in any Tilicetum or Lime-walk abroad it be considerably exceeded: Yet was the first motive I had to view it not so much the largeness of the tree, as the general opinion that no man could even name it; but I found it to be a Tilia Fœmina; and (if the distinction of Bauhinus be admitted from the greater and lesser leaf) a Tilia Platyphyllos, or Latifolia; some leaves being three inches broad; but to distinguish it from others in the country, I called it Tilia Colossæa Depehamensis.”

A Poplar tree, not much inferior to this, he likewise informs me grew lately at Harling, by Thetford, at Sir William Gawdy's gate, blown down by that terrible hurricane about four years since.

Thus that learned person: From these instances, I am not apt so much to admire what is pretended so mightily to exceed the refreshing shades of some of our Oaks, Beeches, Elms, and other ample umbrages, if diligently compared, as I am to impute it to what the younger Pliny attributes to men's affecting novelties, that *tanta suarum rerum satietas, aliarumque aviditas.*

But here does properly intervene the *Linden* of Schalouse, in Swisse, under which is a bower composed of its branches, capable of containing three hundred persons sitting at ease: it has a fountain set about with many tables, formed only of the boughs, to which they ascend by steps, all

kept so accurately, and so very thick, that the sun never looks into it. But this is nothing to that prodigious Tilia of Neustadt, in the Duchy of Wirtemberg, so famous for its monstrosity, that even the city itself receives a denomination from it, being called by the Germans *Neustadt ander grossen Linden*, or Neustadt by the great Lime tree. The circumference of the trunk is twenty-seven feet four fingers; the ambitus, or extent of the boughs, four hundred and three *feré*; the diameter, from south to north, one hundred and forty-five; from east to west, one hundred and nineteen feet; set about with divers columns and monuments of stone, (eighty-two in number at present, and formerly above an hundred more) which several Princes and Noble Persons have adorned, and celebrated with inscriptions, arms, and devices, and which, as so many pillars, serve likewise to support the umbragious and venerable boughs; and that even the tree had been much ampler, the ruins and distances of the columns declare, which the rude soldiers have greatly impaired:

By the date of the antientest columns, yet intire, namely, *Anno 1555*, may be conjectured how goodly a tree it was almost two hundred years since. The inscriptions on the several arms and supporters are as follows:

D. V. H. Z. W. CLE.—*Graff zu Leuchtenberg. 1591. 1583. 1575. Albert von Rosenberg Ritter. 1591. Wolff Keidel alter Furlentum. 1555. (Some report he planted it.) Hans Heinric vorder Tana. 1583, Conrad von Flbeg. 1575. Friz Nerter von Hertenek. 1575. Wirich von Gemmingen. 1575. Bartol—Mot. 1555. V. Hans Funk der zeit Burgermeister Die erst, 1555. Hans Ulrich Stigelheimer zu Duratbenig Fuflicker. hr. Hoffmeister. 1591.*

Præsul de Langheim rediens Cisterliæ ab urbe
Pyramidem hanc posuit flammis Cœlestibus auctam.
Sentiat hæc etiam Numen spirabile toto
Pectore, & illius semper sit munere foelix.

Johann. Abt zu Langh. 1601. Joh. Abt zu Schoenthal. 1584. Eberhard von Gimmingen. 1555. David von Helmstad Amtman. Graff Fridrich zu Mompelyard. Hans Henrick von Lammestein. Sigismund Signiger. L. H. Z. W. A. 353. G. L. Mary Graff au Brandenb. 1562. Georg. Ernst Graff zu Henneb. Herr zu Aschaffb. 1575. Michel Helmling Statt-schreiber. 1555. Hans Ulrich von Steine. 1575. Daniel von Helmstatt. zu Kappenaw. 1556. ——— Stamel von Reischbach 1575. Willhelm von Crembach 1588. Bernolp von

Book III. *Gammingen.* 1588. *Schweiker Wumbold von Umstatt.* 1591. *Heinrich Link Pfarrer zu Uden.* *Andreas von Oberbach Vorsteist.* zu *Neu-statt.* *Neubrecht Bart Keller* zu *Neu-statt.* 1557. — *Ernberg.* *Thomas Busch von Scherndorff.* *Wolfgang von Gemmingen* 1588. *Feit Kumeter Forstmeister.* 1551 and 1530.

After this we might forbear the naming that at Tillburg, near Buda in Hungary, growing in the middle of the street, extending to sixty-two paces from the stem, sustained by twenty-eight columns: Nor that nearer us, at Cleves in the Low Countries, a little without the entering into the town, cut in eight faces supported with pillars, and containing a room in the middle, the head of the tree curiously shaped. I say, I need not have charged this paragraph with half these, but to shew how much more the Lime tree seems to be disposed to be brought into these arborious wonders, than other trees of slower growth; and yet I am told of a White Thorn, at Worms in Germany, planted in the center of the quadrangle of the great church, whose branches, held up with stone, are in circle fifty paces: Several more occur, too tedious to recite. But what is all this, take the most spreading of them, to what we shall shew, whilst that of Neustadt comes not yet by forty feet near to the dimensions of an Oak standing lately in Worklop Park, belonging to his Grace the Duke of Norfolk, Earl Marshal of England, spreading almost three thousand yards square, and under the shade whereof near a thousand horse might commodiously stand at once. But, besides the gigantic Lime tree, there is likewise a White Thorn, brought (as the tradition goes) a small twig out of Palestine, Anno 1470, by Eberhard, first Duke of Wirtemberg, and planted near Tubing, where he founded St. Peter's Monastery, the branches whereof being sustained by forty columns of stone, is yet a flourishing tree. It is probable that of Glastonbury is of this kind, and above a thousand years antienter, if the report be true. At Forti grows a Filbert whose trunk is as big as three men's middles: Near Efsling is a Juniper tree of almost two feet diameter in the lower trunk, and very tall. These prodigies, with several more, we have from Dr. Faber, Physician to Frederic Duke of Wirtemberg, and collected by the late industrious Jesuit Schotti, in his Appendix ad Lib. ii. De Mirabilibus Miscellaneis. Nor may here that goodly Birch tree be forgotten, which growing in one of the courts of the palace of Augsburgh, is so spreading, as that the branches will cover three hundred and sixty-five tables, even as many as there are days in the year, with its shade, as Tavernier tells us in his Travels. Mr. Cook, in his ingenious and useful Treatise, mentions a Witch Elm growing within these

three or four years in Sir Walter Baggot's park in the county of Stafford, which, after two men had been five days felling, lay forty yards in length, and was at the stool seventeen feet diameter: It broke in the fall fourteen load of wood, forty-eight in the top: Yielded eight pair of naves, eight thousand six hundred and sixty feet of boards and planks: It cost ten pounds seventeen shillings the sawing; the whole esteemed ninety-seven tuns. This was certainly a goodly stick! *

What other prodigious trees do at present, and did formerly, abound in that country, may be seen in Dr. Plot's Natural History. Such was an Oak at Narbury, of fifteen yards in girth, which being felled, two men at either side on horseback could not see one another: Also an Ash of eight feet diameter, the timber of which was valued at thirty pounds.

I am told of a very Withy tree, to be seen somewhere in Berkshire, which is increased to a most stupendous bulk; and of two Witch Hazel trees of prodigious size, growing in Oaksey-Park, belonging to Sir Edw. Pooles, near Malmesbury in Wiltshire, not inferior to the largest Oaks: But these, for arriving hastily to their *acme* and period, and generally not so considerable for their use, I pass to the Ash, Elm, Oak, &c.

There were of the first of these divers which measured in length one hundred and thirty-two feet, sold lately in Essex†; and in the manor of Horton (to go no farther than the parish of Ebbsham in Surry, belonging to my brother Richard Evelyn, Esq;) there are Elms standing in good numbers, which would bear almost three feet square for more than forty feet in height, which is, in my judgment, a very extraordinary matter. They grow in a moist gravel, and in the hedge-rows.

N O T E S.

* I have heard, but cannot authenticate the fact, that a Wych-Elm was lately felled in the Earl of Hertford's park at Lisburne, in Ireland, which was found to contain ninety-nine tuns of timber.

† There stands now at Ley, or Leix, in the Queen's County in Ireland, an Ash tree thirty-nine feet in circumference near the ground; at about six feet from the ground twenty-eight feet. The bole does not rise above fifteen feet high before it sends out its noble branches, which extend round it to a prodigious distance. The height of the tree is not less than an hundred and twenty feet, but its youthful vigour and wonderfully thick foliage promise a considerable increase

BOOK III.

Not to insist upon Beech, which are frequently very large, there are Oaks of forty feet high and five feet diameter yet flourishing in divers old parks of our Nobility and Gentry; and Firs of one hundred and fifty feet in height, which are exceeded by one growing in a wood about Bern by almost one hundred feet, as Chabrous tells us.

A large and goodly Oak there is at Reedham, in Sir Richard Berney's Park of Norfolk, which I am informed was valued at forty pounds the timber, and twelve pounds the lopping wood.

Nor are we to over-pass those memorable trees which so lately flourished in Dennington Park near Newbury; amongst which three were most remarkable from the dedication of the ingenious planter (if tradition hold) the famous English Bard, Geoffry Chaucer; of which one was called the King's, another the Queen's, and a third Chaucer's Oak. The first of these was fifty feet in height before any bough or knot appeared, and cut five feet square at the but-end, all clear timber. The Queen's was felled since the wars, and held forty feet of excellent timber, straight as an arrow in growth and grain, and cutting four feet at the stub, and near a yard at the top; besides a fork of almost ten feet clear timber above the shaft, which was crowned with a shady tuft of boughs, amongst which, some were on each side curved like rams horns, as if they had been so industriously bent by hand. This Oak was of a kind so excellent, cutting a grain clear as any clap-board, (as appeared in the wainscot which was made thereof) that it is a thousand pities some seminary of the acorns had not been propagated, to preserve the species. Chaucer's Oak, though it were not of these dimensions, yet was it a very goodly tree: And this account I received from my most honoured friend Phil. Packer, Esq; whose Father (as lately the Gentleman his Brother) was proprietor of this park: But that which I would farther remark, upon this occasion, is the bulk and stature to which an Oak may possibly arrive within less than three hundred years, since it is not so long that our Poet flourished, (being in the reign of King Edward III.) if at least he were indeed the planter of those trees, as it is confidently affirmed. I will not labour much in this enquiry, because an implicit faith is here of great encouragement; and it is not to be conceived what trees of a good kind, and in apt soil, will perform in a few years; and this, I am informed, is a sort of gravelly clay, moistened with small and frequent springs. In the meanwhile, I have often wished that Gentlemen were more curious of transmitting to posterity such records, by noting

the years when they begin any considerable plantation, that the ages to come may have both the satisfaction and encouragement by more accurate and certain calculations. Henry Ranjovius planted a grove in Ditmarsh, Anno 1580, of Oak, Fir, Beech, Birch, &c. and erected a stone with this inscription, (which I mention not for its elegancy, but example) *An. Dom. 1580. Quercus, Abietes, Betulas, &c. Plantavit: Annum & Initium sationis adscribi jussit, ut earum Aetatem exploraret posteritas; quod in omnia Orbis secula aeternae Divinitati commendat*, as I find it recorded by that industrious genealogist, Scipio Amiratus of Florence: But the only instance I know of the like in our own country is in the park at Althorp in Northamptonshire, the magnificent seat of the Right Hon. the Earl of Sunderland. I find a Jewish tradition, cited by the learned Bochart, that Noah planted the trees (he supposes Cedars) of which he afterwards built the ark that preserved him: Nor was it esteemed any diminution for Princes themselves to plant trees with that hand which held the scepter and reins of empire: So as in the Voorhout of the Hague, stands a tree placed there by the hands of the Emperor Charles, which is yet in its prime growth, and no small boast of the good people. But to proceed:

There was in Cunsborough (sometimes belonging to my Lord of Dover) several trees bought by a Cooper, of which he made ten pounds per yard for three or four yards, as I have been credibly assured. But where shall we parallel that mighty tree which furnished the main-mast to the sovereign of our seas, which being one hundred feet long save one, bare thirty-five inches diameter; yet was this exceeded in proportion and use by that Oak which afforded those prodigious beams that lie 'thwart her. The diameter of this tree was four feet nine inches, which yielded four square beams of four and forty feet long each of them. The Oak grew about Framlingham in Suffolk; and indeed it would be thought fabulous to recount only the extraordinary dimensions of some timber-trees growing in that country, and the excessive sizes of these materials, had not mine own hands measured a plank, more than once, of above five feet in breadth, nine and an half in length, and six inches thick, all intire and clear, not reckoning the slab *. This plank, cut out of a tree felled by my grandfather's order, was made a paltry-board, and lay on a frame of solid brick-work

NOTES.

* The word *Slab*, amongst Sawyers, is the *Affer materia extimus*, or sappy substance next the bark.

Book III.

at Wotton, in Surry, where it was so placed before the room was finished about it, or wall built, and yet abated by one foot shorter, to confine it to the intended dimensions of the place; for at first it held this breadth, full ten feet and an half in length: By an inscription cut in one of the sides, it had lain there above an hundred years. To this may be added that table of one plank, of above seventy-five feet long, and a yard broad thro' the whole length, now to be seen in Dudley-Castle Hall, which grew in the park described by Dr. Plot in his Natural History of Staffordshire. Merfennus tells us that the great ship called the Crown, which the late French King caused to be built, has its keel-timber one hundred and twenty feet long; and the main-mast twelve feet diameter at the bottom, and eighty-five in height.

To these I might add a Yew-tree* in the church-yard of Crowhurst, in the county of Surry, which I am told is ten yards in compass; but especially that superannuated Yew-tree growing now in Braburne church-yard, not far from Scots-Hall in Kent; which being fifty-eight feet eleven inches in the circumference, will bear near twenty feet diameter, as it was measured first by myself imperfectly, and then more exactly for me, by order of the late Right Honourable Sir George Carteret, Vice-Chamberlain to his Majesty, and late Treasurer of the Navy: Not to mention the goodly planks, and other considerable pieces of squared and clear timber, which I observed to lie about it, that had been hewed and sawn out of some of the arms only torn from it by impetuous winds. Such another monster, I am informed, is also to be seen in Sutton church-yard, near Winchester. To these we add what we find taken notice of by the learned and industriously curious Dr. Plot, in his Natural History of Oxfordshire; particularly an Oak between Nuncham-Courtney and Clifton, spreading, from bough-end to bough-end, eighty-one feet, shading in circumference five hundred and sixty square yards of ground, under which two thousand four hundred and twenty men may commodiously stand in shelter. And a bigger than this may be seen near the gate of the water-walk at Magdalen-College, whose branches shoot sixteen yards from the stem; likewise another at Rycote, in Lord Norris's park, extending its arms fifty-four feet, under which three hundred and four horses, or four thousand three

NOTES.

* The ingenious Mr. Pennant, in his Tour in Scotland, mentions a Yew-tree in Fotheringal Church-yard, whose ruins measured fifty-six feet and a half in circumference.

hundred and seventy-four men may sufficiently stand. This is that *Robur Britannicum* so much celebrated by the late Author of Dodona's Grove, and under which he leans contemplating in the frontispiece. But these (with infinite others which I am ready to produce) might fairly suffice to vindicate and assert our proposition, as it relates to modern examples, and sizes of timber-trees, comparable to any of the antients, remaining upon laudable and unsuspected records, were it not great ingratitude to conceal a most industrious and no less accurate account, which comes to my hands from Mr. Halton, Auditor to the Right Honourable the most Illustrious and Noble Henry Duke of Norfolk, Earl Marshal of England.

IN SHEFFIELD LORDSHIP.

In the Hall-park, near unto Rivelin, stood an Oak which had eighteen yards without bough or knot, and carried a yard and six inches square at the said height or length, and not much bigger near the root; it sold twelve years ago for eleven pounds. Consider the distance of the place and country, and what so prodigious a tree would have been worth near London.

The names of
the persons
who gave in-
telligence of
the particu-
lars.
Edw. Rawson.

In Firth's Farm, within Sheffield Lordship, about twenty years since, a tree blown down by the wind made, or would have made, two forge-hammer beams; and in those, and the other wood of that tree, there was worth, or made, fifty pounds; and Godfrey Frogat, who is now living, did oft say he lost thirty pounds by the not buying of it.

Capt. Bullock.

A hammer-beam is not less than seven yards and a half long, and four feet square at the barrel.

In Sheffield park, below the Manor, a tree was standing which was sold by one Gifford (servant to the then Countess of Kent) for two pounds ten shillings, to one Nicholas Hicks, which yielded of sawn wair fourteen hundred, and, by estimation, twenty cords of wood.

A wair is two yards long and one foot broad, six score to the hundred: so that in the said tree were ten thousand and eighty feet of boards, which, if any of the said boards were more than half an inch thick, renders the thing yet more admirable.

Ed. Morphy,
Wood-ward.

In the upper end of Rivelin stood a tree, called the Lord's Oak, of twelve yards about, and the top yielded twenty-one cord; cut down about thirteen years since.

Book III. In Sheffield Park, Ann. 1646, stood above one hundred trees worth a thousand pounds, and there are yet two worth above twenty pounds. Still note the place and market.

In the same park, about eight years ago, Ralph Archdall cut a tree that was thirteen feet diameter at the kerf, or cutting-place near the root.

In the same park, two years since, Mr. Sittwell, with Jo. Magson, did choose a tree, which, after it was cut, and laid aside flat upon a level ground, Samuel Staniforth, a keeper, and Edward Morphy, both on horseback, could not see over the tree one another's hat crowns. (And such another was the Narbury Oak, mentioned in a former part of this chapter.) This tree was afterwards sold for twenty pounds.

In the same park, near the old Ford, is an Oak tree, yet standing, of ten yards circumference. *

John Halton.

In the same park, below the Conduit plain, is an Oak tree which bears a top, whose boughs shoot from the bole some fifteen and some sixteen yards.

Then admitting fifteen yards and a half for the common, or mean extent of the boughs from the bole, which being doubled, is thirty-one yards; and if it be imagined for a diameter, because the ratio of the diameter to the circumference is $1\frac{1}{3}$ it follows $113.355 :: 31.97\frac{1}{3}$ yards, which is the circumference belonging to this diameter.

Then further it is demonstrable in geometry, that half the diameter multiplied into half the circumference, produces the area or quantity of the circle, and that will be found to be $754\frac{1}{3}$, which is 755 square yards *feré*.

N O T E S.

* Neither this, nor any of the Oaks mentioned by Mr. Evelyn, bear any proportion to one now growing at Cowthorpe, near Wetherby, upon an estate belonging to the Right Hon. Lady Stourton. The annexed plate is taken from a drawing made upon the spot by my worthy and ingenious friend William Burgh, Esq. The dimensions are almost incredible. Within three feet of the surface it measures sixteen yards, and close by the ground, twenty-six yards. Its height, in its present and ruinous state (1776) is about eighty-five feet, and its principal limb extends sixteen yards from the bole. Throughout the whole tree, the foliage is extremely thin, so that the anatomy of the antient branches may be distinctly seen in the height of summer. When compared to this, all other trees are but *Children* of the Forest.



W. Burgh Esq. delin.

A Winter View of the Carwithorpe Oak.

J. M. fecit.

Then lastly, if a horse can be limited to three square yards of ground to stand on, (which may seem a competent proportion of three yards long, and one yard broad) then may two hundred and fifty-one horses be well said to stand under the shade of this tree. But of the more northern cattle, certainly above twice that number. CHAP. III.

WORKSOP PARK.

In this park, at the corner of Bradshaw-rail, lieth the bole of an Oak tree, which is twenty-nine feet about, and would be found thirty if it could be justly measured, because it lieth upon the ground; and the length of the bole is ten feet, and no arm nor branch upon it. Ken. Homer.

In the same park, at the White Gate, a tree did stand that was from bough-end to bough-end (that is from the extreme ends of two opposite boughs) one hundred and eighty feet; which is witnessed by Jo. Magfon and George Hall, and measured by them both. Jo. Hall.
Geo. Magfon.

Then because 180 feet, or 60 yards, is the diameter, 30 yards will be the semidiameter: And by the former analogies

$$113. 355 :: 60. 188\frac{1}{2} \text{ and } 1. 30 :: 94\frac{1}{2}. 2827\frac{1}{2}$$

That is, the content of ground upon which this tree perpendicularly drops, is above 2827 square yards, which is above half an acre of ground: and the assigning three square yards (as above) for an horse, there may 942 be well said to stand in this compass.

In the same park (after many hundreds sold and carried away) there is a tree which did yield quarter-cliff bottoms that were a yard square; and there is of them to be seen at Worksop at this day, and some tables made of the said quarter-cliff likewise. Jo. Magfon.

In the same park, in the place there called the Hawk's Nest, are trees 40 feet long of timber, which will bear two feet square at the top end or height of forty feet.

If then a square, whose side is two feet, be inscribed in a circle, the proportions at that circle are,

	Feet.
Diameter	2 : 8284
Circumference	8 : 8858
Area	6 : 2831

BOOK III.

* A statutable
ton of timber is
by some reck-
oned forty-
three feet of
solid: and to a
load fifty.

And because a ton of timber is said to contain forty solid feet, one of these columns of Oak will contain above six ton of timber and a quarter*; in this computation they are taken to be Cylinders, and not tapering like the segments of a Cone.

WELBECK LANE.

The Oak which stands in this lane, called Greendale Oak, hath at these several distances from the ground these circumferences,

	Feet	Feet	Inches
at 1	33	:	01
at 2	28	:	05
at 6	25	:	07

The breadth is, from bough-end to bough-end, diametrically 81 feet; the height from the ground to the topmost bough, 81 feet. [This dimension taken from the proportion that a gnomon bears to the shadow] There are three arms broken off and gone, and eight very large ones yet remaining, which are very fresh and good timber.

Eighty-eight feet is 29 yards, which being in this case admitted for the diameter of a circle, the square yards in that circumference will be 676 *feré*; and then allowing three yards (as before) for a beast, leaves 225 beasts, which may possibly stand under this tree.

But the Lord's Oak, that stood in Rivelin, was in diameter three yards and 28 inches, and exceeded this in circumference three feet, at one foot from the ground.

SHIRE-OAK.

Hen. Homer.

Shire-Oak is a tree standing in the ground late Sir Thomas Hewet's, about a mile from Workop Park, which drops into three Shires, viz. York, Nottingham, and Derby, and the distance from bough-end to bough-end is 90 feet, or 30 yards.

This circumference will contain near 707 square yards, sufficient to shade 235 horses.—Thus far the accurate Mr. Halton.

Now such venerable trees (especially conspicuously placed as this last) should be spared for the most noble and natural boundaries to great parishes, and Gentlemen's estates; famous for which is the Chestnut tree at Tamworth in Gloucestershire; which continued a signal boundary to that Manor in King Stephen's time, as it stands upon record. And now before



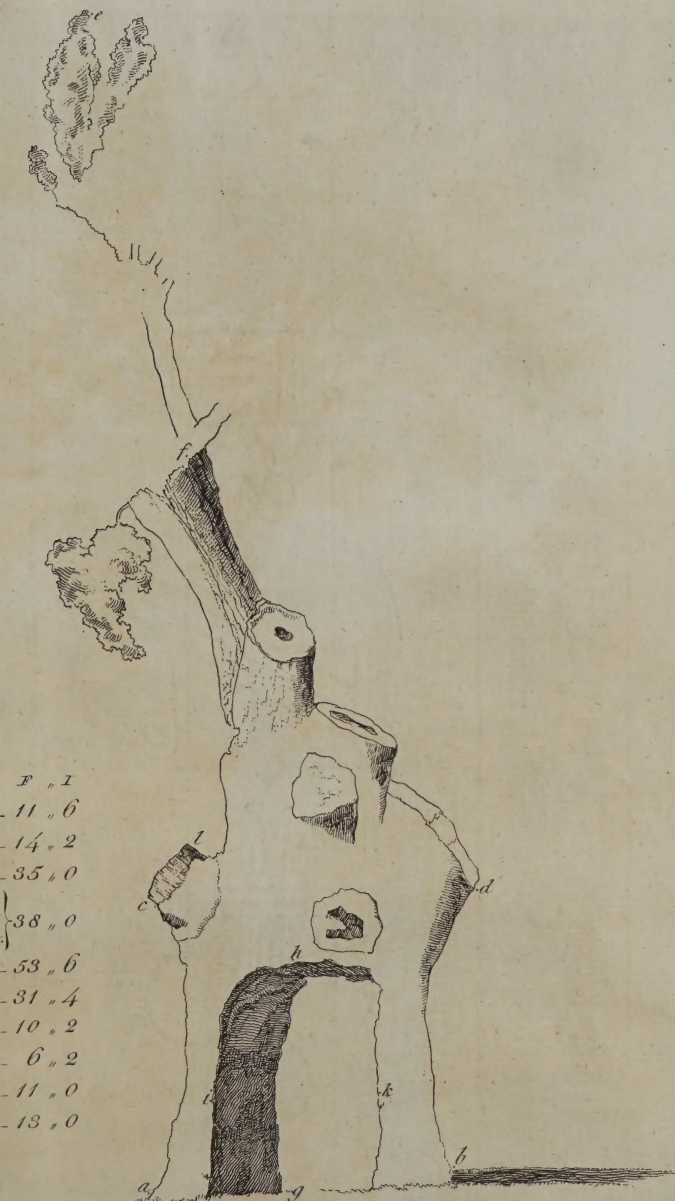
H. Grimm Delin^t 1775

Tho^s. Vivares Sculpsit.

A South East View of the Green Dale Oak near Welbeck.

Published Jan^y 1st 1776. by A. Stanger M.D. as the Act directs.

	<i>F</i> " <i>I</i>
Diameter at <i>a. b.</i>	11 " 6
Diam ^r at <i>c. d.</i>	14 " 2
Girth upon Stretch at <i>c. d.</i>	35 " 0
Girth at the same place to follow the hollows of the Tree.	38 " 0
Height of the Tree <i>a. e.</i>	53 " 6
Height at <i>a. f.</i>	31 " 4
Height of the Arch <i>g. h.</i>	10 " 2
Width at <i>i. k.</i>	6 " 2
Girth of the Stump <i>c. l.</i>	11 " 0
Height at <i>b. d.</i>	13 " 0





J. H. Grimm Delin. 1775.

A. Rooker Sculpit.

A North West View of the Green Dale Oak near Welbeck.

Published Jan^y 1. 1776. by A. Hunter M.D. as the Act directs



	<i>F. I</i>
<i>Diameter at a. b.</i>	12 . 0
<i>Diam^r. at c. d.</i>	11 . 0
<i>Diam^r. at e. f.</i>	13 . 3
<i>Girth at c. d.</i>	34 . 10
<i>Height of the Tree g. l.</i>	53 . 6
<i>Height of the Arch g. h.</i>	10 . 2
<i>Width at i. k.</i>	6 . 2

I shut up these encouraging instances, I am informed by a person of credit, that an Oak in Sheffield Park, called the Lady's Oak, when felled, contained forty-two tons of timber, which had arms that held at least four feet square for ten yards in length; the body six feet of clear timber: That in the same park one might have chosen above one thousand trees worth above six thousand pounds; another thousand worth four thousand pounds, *&c sic de cæteris*. To this Mr. Halton replies, That it might possibly be meant of the Lord's Oak already mentioned to have grown in Rivelin; for now Rivelin itself is totally destitute of that issue she once might have gloried in of Oaks, there being only the Hall Park adjoining, which keeps up with its number of Oaks. And as to the computation of one thousand trees formerly in Sheffield Park, worth six thousand pounds, it is believed there were a thousand much above that value, since, in what is now inclosed, it is evident touching one hundred worth a thousand pounds. I am informed, that an Oak (I think in Shropshire) growing lately in a copse of my Lord Craven's, yielded nineteen tons and a half of timber, twenty-three cord of fire-wood, two load of brush, and two load of bark: And my worthy friend, Leonard Pinckney, Esq; lately First Clerk of his Majesty's Kitchen, did assure me, that one John Garland built a very handsome barn, containing five bays, with pan, posts, beams, spars, &c. of one sole tree, growing in Workop Park. I will close this with an instance which I greatly value, because it is transmitted to me from that Honourable and Noble Person Sir Edward Harley. "I am (says he) assured by an inquisition taken about three hundred years since, that a park of mine, and some adjacent woods, had not then a tree capable to bear acorns; yet that very park I have seen full of great Oaks, and most of them in the extreme wane of decay. The trunk of one of these Oaks afforded so much timber as upon the place would have yielded fifteen pounds, and did compleatly seat with wainscot-pews a whole church. You may please (says he, writing to Sir Robert Murray) to remember when you were here, you took notice of a large tree, newly fallen; when it was wrought up, it proved very hollow and unsound: One of its cavities contained two hogsheds of water: Another was filled with better stuff, wax and honey: Notwithstanding all defects, it yielded, besides three tons of timber, twenty-three cords of wood. But my own trees are but chips in comparifon of a tree in the neighbourhood, in which every foot forward, one with another, was half a ton of timber; it bore five feet square, forty feet long; it contained twenty ton of timber, most of it fold for one pound per ton; besides that, the boughs afforded

BOOK III. twenty-five cords of fuel-wood: This was called the Lady-Oak. Is it not pity such goodly creatures should be devoted to Vulcan?" So far this Noble Gentleman, to which I would add *Diræ*, a deep execration of Iron-Mills, and I had almost said Iron-Masters too,

Quos ego—sed motos præstat componere—

for I should never finish, to pursue these instances thro' our once goodly magazines of timber for all uses, growing in this our native country, comparable, as I said, to any we can produce of elder times; and that not only (though chiefly) for the encouragement of planters, and preservers of one of the most excellent and necessary materials in the world for the benefit of man, but to evince the continued vigour of nature, and to reproach the want of industry in this age of ours; and (that we may return to the argument of this large chapter) to assert the procerity and stature of trees from their very great antiquity: For certainly, if that be true, which is by divers affirmed concerning the Quercetum of Mamre, (where the Patriarch entertained his angelical guests) recorded by Eusebius to have continued till the time of Constantine the Great, we are not too prejudicately to censure what has been produced for the proofs of their antiquity; nor for my part do I much question the authorities. But let this suffice; what has been produced, being not only an historical speculation of encouragement and use, but such as was pertinent to the subject under consideration, as well as what I am about to add concerning the texture and similar parts of the body of trees, which may also hold in shrubs, and other lignous plants, because it is both a curious and rational account of their anatomization, and worthy of the sagacious enquiry of that learned person, the late Dr. Goddard, as I find it entered amongst other of those precious collections of this illustrious society.

The trunk or bough of a tree being cut transversely plain and smooth, sheweth several circles or rings more or less orbicular, according to the external figure, in some parallel proportion, one without the other, from the center of the wood to the inside of the bark, dividing the whole into so many circular spaces. These rings are more large, gross, and distinct in colour and substance in some kind of trees, generally in such as grow to a great bulk in a short time, as Fir, Ash, &c. smaller or less distinct in those that either not at all, or in a longer time grow great; as Quince, Holly, Box, Lignum Vitæ, Ebony, and the like sad-coloured and hard woods; so that by the largeness or smallness of the rings, the quickness or slowness of the growth of any tree may, perhaps, at certainty be estimated.

These spaces are manifestly broader on the one side than on the other, especially the more outer, to a double proportion, or more; the inner being near an equality.

It is asserted, that the larger parts of these rings are on the south and sunny side of the tree, (which is very rational and probable) inasmuch, that by cutting a tree transverse, and drawing a diameter through the broadest and narrowest parts of the rings, a meridian line may be described.

The outer spaces are generally narrower than the inner, not only in their narrower sides, but also on their broader, compared with the same sides of the inner; notwithstanding which, they are for the most part, if not altogether, bigger upon the whole account.

Of these spaces, the outer extremities in Fir, and the like woods, that have them larger and grosser, are more dense, hard, and compact; the inner more soft and spongy; by which difference of substance it is, that the rings themselves come to be distinguished.

According as the bodies and boughs of trees, or several parts of the same, are bigger or lesser, so is the number, as well as the breadth of the circular spaces, greater or less; and the like according to the age, especially the number.

It is commonly, and very probably asserted, that a tree gains a new ring every year. In the body of a great Oak in the New-Forest cut *transversely even*, (where many of the trees are accounted to be some hundreds of years old) three and four hundred have been distinguished. In a Fir tree, which is said to have just so many rows of boughs about it as it is of years growth, there has been observed just *one* less immediately above one row than immediately below. Hence some probable account may be given of the difference between the outer and the inner parts of the rings, that the outermost being newly produced in the summer, the exterior superficies is condensed in the winter.

In the young branches and twigs of trees there is a pith in the middle, which in some, as Ash, and especially Elder, equals or exceeds in dimensions the rest of the substance, but waxes less as they grow bigger, and in the

BOOK III. great boughs and trunk scarce is to be found: This gives way for the growth of the inward rings, which at first were less than the outer, (as may be seen in any shoot of the first year) and after grow thicker, being itself absorbed, or converted into wood; as it is certain cartilages or gristles are into bones, (in the bodies of animals) from which, to sense, they differ even as much as pith from wood.

These rings or spaces appearing upon transverse section (as they appear elliptical upon oblique, and straight lines upon direct section) are no other than the extremities of so many integuments, investing the whole tree, and, perhaps, all the boughs that are of the same age with any of them, or older.

The growth and augmentation of trees, in all dimensions, is acquired not only by accession of a new integument yearly, but also by the reception of nourishment into the pores and substance of the rest, upon which they also become thicker; not only those towards the middle, but also the rest, in a thriving tree: yet the principal growth is between the bark and body, by accession of a new integument yearly, as hath been mentioned; whence the cutting of the bark of any tree or bough round about, will certainly kill it.

The bark of a tree is distinguished into rings or integuments, no less than the wood, though much smaller or thinner, and therefore not distinguishable, except in the thick barks of great old trees, and toward the inside next the wood; the outer parts drying and breaking with innumerable fissures, growing wider and deeper, as the body of the tree grows bigger, and mouldering away on the outside.

Though it cannot appear, by reason of the continual decay of it, upon the account aforesaid, yet it is probable the bark of a tree hath had successively as many integuments as the wood; and that it doth grow by acquisition of a new one yearly on the inside, as the wood doth on the outside; so that the chief way, and conveyance of nourishment to both the wood and the bark, is between them both.

The least bud appearing on the body of a tree, doth, as it were, make perforation through the several integuments to the middle, or very near; which part is, as it were, a root of the bough into the body of the tree,

and after becomes a knot, more hard than the other wood: and when it is larger, manifestly shewing itself also to consist of several integuments, by the circles appearing in it, as in the body: More hard, probably, because straitened in room for growth: as appears by its distending, buckling, as it were, the integuments of the wood about it, so implicating them the more; whence a knotty piece of wood is so much harder to cleave.

It is probable that a cyon or bud, upon grafting or inoculating, doth, as it were, root itself into the stock in the same manner as the branches, by producing a kind of knot.——Thus far the accurate Doctor.

To which permit me to add only (in reference to the circles we have been speaking of) what another curious enquirer suggests to us; namely, that they are caused by the pores of the wood, through which the sap ascends in the same manner as between the wood and the bark; and that in some trees the bark adheres to the wood, as the integuments of wood cleave to one another, and may be separated from each other as the bark from the outwardmost; and being thus parted, will be found on their outsides to represent the colour of the outermost, contiguous to the bark; and on the inner sides, to hold the colour of the inner side of the bark, and all to have a deeper or lighter hue on their inner side, as the bark is on that part more or less tinged; which tincture is supposed to proceed from the ascendant sap. Moreover, by cutting the branch, the ascending sap may be examined as well as the circles. It is probable, the more frequent the circles, the larger and more copiously the liquor will ascend into it; the fewer, the sooner descend from it. That a branch, of three circles, cut off at spring, the sap ascending, will be found at Michaelmas ensuing when cut again in the same branch, or another of equal bigness, to have one more than it had at spring; and either at spring or fall to carry a circle of pricks next the bark; at other seasons a circle of wood only next it. But here the comparison must be made with distinction; for some trees do probably shoot new tops yearly till a certain period, and not after; and some have perhaps their circles in their branches decreased from their bodies to the extremity of the branch, in such œconomy and order, that, for instance, an Apple tree shoot of this year has one circle of pricks or wood less than the graft of two years growth; and that of two years growth may, the next year, have one circle more than it had the last year; but this only till that branch shoot no more grafts, and then it is doubtful whether

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I might here ſubjoin the vegetative motion of plants, with the diagrams of the Jeſuit Kircher, where he diſcourſes of their ſtupendous magnetiſms, &c. could there any thing material be added to what has already been ſo ingeniouſly enquired into by the learned Dr. Grew, in his Anatomy of Vegetables, and that of Trunks; where experimentally, and with extraordinary ſagacity, he diſcuſſes this ſubject, (with entire ſatisfaction of the inquiſitive reader) beginning at the ſeeds, and proceeding to the formation of the root, trunk, branches, leaves, flowers, fruit, &c. where you have the moſt accurate deſcriptions of the ſeveral veſſels for ſap, air, juices, with the ſtupendous contexture of all the organical parts, than which there can be nothing more fully entertaining: So that what Dr. Goddard, and other ingenious men have but conjecturally hinted, is by this inquiſitive perſon (and that of the excellent Malpighius) evinced by autoptical experience, and profound reſearch into their anatomy. To all which we may by no means forget the moſt Lyncean inſpector Mr. Ant. Van Leuwenhoek, concerning the barks of trees, which he affirms, and experimentally convinces, that that integument, namely the bark, was produced from the wood, and not the wood from the bark. But this diſcourſe, together with the microſcopical figure, (being too long to be here inſerted) refers to that moſt induſtrious perſon's letter, Tranſact. Numb. 296, p. 1843. Let us therefore proceed to the Felling,

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It ſhould be in the vigour and perfection of trees (which for the Oak I take to be about the age of fifty, or betwixt that and ſixty years of growth, where the ſoil is natural) that a felling ſhould be celebrated; ſince whiſt our woods are growing it is pity, and indeed too ſoon; and when they are decaying, too late. I do not pretend that a man who has occaſion for timber is obliged to attend ſo many ages e're he fell his trees; but I do by this infer, how highly neceſſary it were that men ſhould perpetually be planting, that ſo poſterity might have trees fit for their ſervice, of competent, that is, of a middle growth and age, which it is impoſſible they ſhould have, if we thus continue to deſtroy our woods, without this providential planting in their ſtead, and felling what we do cut down with great diſcretion and regard of the future.

I know it is an objection, or rather an unreasonable excuse of the slothful neglect of successive and continual planting, that the expectation is tedious of what is not likely to be timber in our time: But this is quite otherwise, provided men would be earlier at the work, for they might have sufficient of their own planting (nay, from the very rudiment and seeds) abundantly to recompense their patience and attendance, living to the age men usually attain by the common course of nature; and with how much improvement to their children and posterity. This minds me of what is reported of the Emperor Maximilian II. who by chance finding an antient husbandman setting Date-stones, he asked him what his meaning was to plant a tree that required an hundred years before it bore fruit. Sir, replies the good man, I have children, and they may have more come after them. At which the Emperor was so well pleased, that he gave him an hundred florins. Was not this like that of Laertes to Ulysses?

But before we go farther with the history of the stature and magnitude of trees, we are not to conclude as if all those trees and plants, which arrive to that enormous stature and bulk we have mentioned, were not to be found in other countries, both of the same and other species; but that even those exoticks, and divers of our own, which seem pigmies and dwarfs, compared to those giants in their native climate, are so much greater than in ours; since we find what we account but shrubs, are divers of them well-grown trees, and prosper into useful timber; such as Juniper, (emulating the tall Cedar) Sabine, Tamarisk, Cornel, Phillyrea, Granade, Lentiscus, Thuya, Laurel, Bays, and even Rosemary, (and other frutexes and lignous plants) superior in growth and stature (than with us) where they spontaneously emerge. Thus not only the White-Mulberry wonderfully outstrips ours, but those of much smaller stature. The Arbutus, growing on Mount Athos, becomes a spreading tree. The Cypress in Candy comes to timber, fit for vast beams and planks of four feet breadth. The Larch over-tops the Fir. Even the Myrtle, with us but a bush, makes staves for spears. The Oleander, & *Humilis Genista*, nay, the Rhododendron, make posts and rafters. Even herbaceous Suffrutages, and amongst the culinary furniture, a grain of Mustard has sprung up to a tree, whose branches afforded harbour to the birds of the air; and the very Hyssop made the stalk that carried a sponge to the mouth of our blessed Lord on the cross. We are told by Josephus, in Macherontis's reign, there was growing a plant of Rue, equal for height and thickness to any Fig tree; it was still remaining in the time of Herod,

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and would have stood longer, had not the Jews cut it down. Jof. Antiq. Bell. Jud. lib. vii. cap. xxxviii. How these, and indeed all other vegetables differ in the north from those of the south, growing on the same mountain, Monsieur Brenier has shewn us; some are nipt and starved with that *penetrabile frigus* and others ruined by the scorching heat, quite changing almost their very nature and constitution; some of them are dry, yielding nothing but leaves; others of the same species are gummy, juicy, and succulent. The *Lentiscus* yields Mastich in Cio; in Italy, the Oak bears Galls; and the *Fraxinus* exudes Manna in Calabria: Thus do Cœlum and Solum govern the vegetable kingdom, for the mutual supply of the most useful productions, especially those of the forest, without which there could be no commerce in the world; for so has Providence ordained. But to return to felling.

Such as we shall perceive to decay, should first be picked out for the ax, and then those which are in their state, or approaching to it; but the very thriving, and manifestly improving, should be indulged as much as possible. To explore the goodness and sincerity of a standing tree, is not the easiest thing in the world: We shall anon have occasion to mention my Lord Bacon's experiment to detect the hollowness of timber: But there is doubtless none more infallible than the boring it with a middling piercer made augur-fashion, and by frequent pulling out, and examining what substance comes along with it, as those who bore the earth to explore what minerals the place is impregnated with, and as sound cheeses are tasted: Some again there are who, by digging a little about the roots, will pronounce shrewdly concerning the state of a tree; and if they find him perished at the top, (for trees die upwards, as men do from the feet) be sure the cause lies deep, for it is ever a mark of great decay in the roots. There is also a swelling vein, which discovers itself eminently above the rest of the stem, though, like the rest, invested with bark, and which frequently circles about and embraces the tree, like a branch of Ivy, which is an infallible indication of hollowness and hypocrisy within.

The time of the year for this destructive work is not usually till about the end of April, (at which season the sap does commonly rise freely) though the opinions and practice of men have been very different: Virtruvius is for an autumnal fall; others advise December and January. Cato was of opinion trees should have first borne their fruit, or at least, not till full ripe; which agrees with that of the architect, who begins his fall

from the commencement of autumn to the spring, when Favonius begins to breathe; and his reason is, that from thence, during all the summer, trees are as it were going with child, and diverting all their nourishment to the embryo, leaves, and fruit, which renders them weak and infirm. This he illustrates from teeming women, who during their pregnancy are never so healthful as after they are delivered of their burden, and abroad again; and for this reason, (says he) those merchants who expose slaves to sale, will never warrant one that is with child: the buyer was (it seems) to stand to the hazard. Thus he: But I remember Monsieur Perrault in his pompous edition of our author, and learned notes upon this chapter, reproves the instance, and corrects the text, à *disparatione procreationis*, &c. to *ad disparationem*, &c. affirming that women are never more sound and healthy than when they are pregnant; the nutrition derived to the infant being (according to him) no diminution or prejudice to the mother, as being but the consumption of that humidity which enfeebles the bearing woman; and thence infers, that the comparison cannot hold in trees, which become so much stronger by it. But to insist no longer on this; there is no doubt, that whilst trees abound in over-much, crude, and superfluous moisture, (though it may, and do contribute to their production and fertility) they are not so fit for the ax as when being discharged of it, and that it rises not in that quantity as to keep on the leaves and fruit, those laxated parts and vessels by which the humour did ascend, grow dry and close, and are not so obnoxious to putrefaction and the worm. Hence it is that he cautions us to take notice of the moon's decline, because of her dominion over liquids, and directs our Woodman (some days before he fells downright) to make the gash or overture *usque ad mediam medullam*, to the end the whole moisture may exsile, for that not only by the bark (which those who resemble trees to animals will have to be analogous to arteries) does the juice drain out, but by that more fatty and whiter substance of the wood itself, immediately under the bark, (and which our carpenters call the sap, and therefore hew away as subject to rot) which they will have to be the veins: It is (say they) the office of these arteries of bark, receiving nourishment from the roots, to derive it to every part of the tree, and to remand what is crude and superfluous by the veins to the roots again; whence, after it has been better digested, it is made to ascend a second time by the other vessels in perpetual circulation; and therefore necessary so deep an incision should be made as may serve to exhaust both the venal and arterial moisture: But for this nice speculation, I refer the curious to the already mentioned Dr. Grew, and to the learned Malpighius,

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who have made other, and far more accurate observations upon this subject. In the mean time, as to that of the worm in timber-trees, and their rotting, sometimes within, and sometimes without; observe that such as gape and rift outwardly, (as does that of the Oak when felled) the sap thereby let out, the timber and heart within is found to be much more solid than that of the Chestnut and other trees who keep the moisture within; in these, however seeming found outwardly, the timber is frequently extremely rotted and perished. Lastly, concerning the bark, though some are for stripping it, and so to let the tree stand till about Mid-June, to preserve it from the worm (all which time it will put forth leaves, and seemingly flourish); yet that which is unbarked is more obnoxious to them, and contracts somewhat a darker hue (which is the reason so many have commended the season when it will most freely strip); however, this were rather to be considered for such trees as one would leave round and unsquared, since we find the wild Oak, and many other sorts, felled over late, and when the sap begins to grow proud, to be very subject to the worm; whereas, being cut about mid-winter, it neither casts, rifts, nor twines, because the cold of the winter does both dry and consolidate; while in spring, and when pregnant, so much of the virtue goes into the leaves and branches. Happy therefore were it for our timber, some real invention of tanning without so much bark (as the Hon. Mr. Charles Howard has most ingeniously offered) were become universal, that trees being more early felled, the timber might be better seasoned and conditioned for its various uses *. But as the custom is, men have now time to fell their woods, even from mid-winter to the spring, but never any after the summer solstice.

And now we speak of tanning, they have in Jamaica the Mangrove, Olive, and a third whose barks tan much better than do ours in England, so as in six weeks the leather is fit to be employed to any use: They have likewise there a tree whose berries wash better and whiter than any Castile soap.

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* Mons. Buffon very justly observes, that the trees intended to be felled for service should first be stripped round of their bark, and then suffered to stand and die upon the spot before they are cut: By this means the sappy part, or blea of the tree, becomes as hard and firm as the heart, and the real strength and density of the wood has been proved, by many experiments, to be greatly increased by it.

Then for the age of the moon, it has religiously been observed; so that Diana's Presidency in Sylvis was not so much celebrated to credit the fictions of the Poets, as for the dominion of that moist planet, and her influence over-timber: However, experienced men commend the felling soon after a full moon, and so during all the decrease, and to let the tree lie at least three months, to render the timber strong and solid: For my part, I am not so much inclined to these criticisms, that I should altogether govern a felling at the pleasure of this mutable Lady; however, there is doubtless some regard to be had:

Nec frustra signorum obitus speculamur & ortus.

Nor is't in vain signs fall and rise to note.

As to other more recondit and deep astrological observations, minute and scrupulous, they are, perhaps, not altogether to be rejected, both as to the various configurations of the superior bodies, and operation on both vegetable and sensitive, especially as to the growth of fruit, sowing, planting, and cultivating (indicating the proper seasons, according to the access and recess of the greater luminaries through the zodiack): It were ingratitude to impute it all to the superstition of the antients, or the total ignorance of causes in those great and learned men (such as Hesiod, Virgil, Cato, Varro, Columella, Pliny, and the rest) who have so freely left us these lessons; doubtless from their long experience, and extraordinary penetration and enquiry into nature. Let the curious then, for his better satisfaction, consult that learned treatise of judicial astrology, written by Sir Christopher Heydon.

In the mean time the old rules are these:

Fell in the decrease, or four days after the conjunction of the two great luminaries: some the last quarter of it; or (as Pliny) in the very article of the change, if possible, which happening, saith he, in the last day of the winter solstice, that timber will prove immortal: At least it should be from the twentieth to the thirtieth day, according to Columella: Cato four days after the full, as far better for the growth, nay, Oak in the summer; but all vimineous trees *silente luna*, such as Sallows, Birch, Poplar, &c. Vegetus for ship-timber, from the fifteenth to the twenty-fifth; the moon as before: But never during the increase, trees being then most abounding

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with moisture, which is the only source of putrefaction: And yet it is affirmed upon unquestionable experience, that timber cut at any season of the year, in the old moon, or last quarter, when the wind blows westerly, proves as sound and good as at any other period whatsoever; nay, all the whole summer long, as in any month of the year, especially trees that bear no fruit. Theophrastus will have the Fir, Pine, and Pitch tree felled when first they begin to bud: I enumerate them all, because it may be of great use on some publick emergencies.

Then for the temper and time of day: The wind low, neither east nor west, (but west of the two) the east being most pernicious, and exposing it to the worms, and for which the best cure is, the plentiful fobbing it in water; neither in frosty, wet, or dewy weather; and therefore never in a forenoon, but when the season has been a good while dry and calm; for as the rain fobs it too much, so the wind closes and obstructs the moisture from ouling out. Lastly, touching the species: Fell Fir when it begins to spring; not only because it will then best quit its coat and strip, but for that they hold it will never decay in water; which howsoever Theophrastus deduces from the old bridge made of this material over a certain river in Arcadia, cut in this season, is hardly sufficient to satisfy our enquiry.

Previous to this work of felling is the advice of our countryman Markham, and it is not to be rejected: Survey, saith he, your woods as they stand, immediately after Christmas, and then divide the species in your mind, (I add rather in some note-book or tables) and consider for what purposes every several kind is most useful, which you may find in the several Chapters of this Discourse under every head. After this reckon the bad and good together, so as one may put off the other, without being forced to glean your woods of all your best timber. This done, or before, you shall acquaint yourself with the marketable prices of the country where your fell is made, and that of the several sorts; as what so many inches or feet square, and long, is worth for the several employments: What planks, what other scantlings, for so many spoaks, naves, rings, pales, poles, spurs, &c. as suppose it were Ash, to set apart the largest for the Wheel-wright, the smallest for the Cooper, and that of ordinary scantling for the plows, and the brush to be kidded and sold by the hundred or thousand, and so all other sorts of timber, viz. large, middling stuff and poles, &c. allowing the waste for the charges of felling, &c. all which you

shall compute with greater certainty, if you have leisure, and will take the pains to examine some of the trees, either by your own fathom, or (more accurately) by girting them about with a string, and so reducing them to the square, &c. by which means you may give a near guess; or, you may mark such as you intend to fell; and then begin your sale about Candlemas till the spring; before which you must not (according as our custom is) lay the ax to the root; though some for particular employments, as for timber to make plows, carts, axle-trees, naves, harrows, and the like husbandry-tools, do frequently cut in October.

Being now entering with your workmen, one of the first and most principal things is, the skilful disbranching of the bole of all such arms and limbs as may endanger it in the fall, wherein much forecast and skill is required of the woodman, so many excellent trees being utterly spoiled for want of this only consideration; and therefore in arms of timber which are very great, chop a nick underneath close to the bole, so meeting it with downright strokes, the arm will be severed without splicing.

We have shewed why some, four or five days before felling, bore the tree cross-way; others cut a kerf round the body, almost to the very pith or heart, and so let it remain a while; by this means to drain away the moisture, which will distil out of the wounded veins, and is chiefly proper for the moister sort of trees: and in this work the very ax will tell you the difference of the sex, the male being so much harder and browner than the female: But here (and where ever we speak thus of plants) you are to understand the analogical, not proper distinctions.

But that none may wonder why in many authors, of good note, we find the fruit-bearers of some trees called Males, and not rather Females, as particularly the Cypress, I shall observe that this preposterous denomination had its source from very antient custom, and was first begun in Egypt, (Diodorus says in Greece) where we are told, that the father only was esteemed the sole author of generation; the mother contributing only receptacle and nutrition to the offspring, which legitimated their mixtures as well with their slaves as free-women: And upon this account it was, that even trees bearing fruit, were amongst them reputed males, and the sterile and barren ones females; and we are not ignorant how learnedly this doctrine has been lately revived by some of our most celebrated Physicians:

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But since the same arguments do not altogether quadrate in trees, where the coition is not so sensible, (whatever they pretend of the Palms) I am of opinion we might with more reason call that the Female which bears any eminent fruit, seed or egg, (from whence animals, as well as trees, not excepting Man himself, as the learned Steno, Swammerdam, and others have, I think, undeniably made out) and them Males which produce none: But sometimes too the rudeness or less asperity of the leaves, bark, and grain, nay, their medical operations, may deserve the distinction; to which Aristotle adds. branchiness, less moisture, quick maturity, &c. lib. i. de Plin. cap. iii. All which seems to be most conspicuous in Plum trees, Hollies, Alhes, Quince, Pears, and many other sorts; not to insist on such as may be compelled even to change, as it were, their sex, by grafting and artificial improvements: For whatever we are told of such evident distinction of sexes in some (*Malus Medica*, &c. *) I look upon it as happening rather through some accidental protrusion, artificial exuberance, or depression, than constant and natural.—But I return to Felling.

* Maris enim pomum adnatum habet quoddam veluti infantis genitale ejusdem cum pomum corticis et coloris; Fœminæ muliebri pudendum ad veram ejus effigiem efformatum videtur, quo simile magis sculpsit non fingat. Maranch, lib. xi. cap. xi.

When this is performed you should leave the stools as close to the ground as possible may be, especially if you design a renaſcency from the roots; unless you will grub for a total destruction, or the use of that part we have already mentioned, so far superior in goodness to what is more remote from the root, and besides the longer you cut and convert the timber, the better for many uses. Some are of opinion, that the seedling Oak should never be cut to improve his bole; because, say they, it produces a reddish wood, not acceptable to the workman; and that the tree which grows on the head of his mother, does seldom prove good timber: It is observed, indeed, that one foot of timber near the root (which is the proper kerf, or cutting place) is worth three farther off; though I know divers who think otherwise: And haply, the successor is more apt to be tender than what was cut off to give it place; but let this be enquired into at leisure. If it be a winter-fell for fuel, prostrate no more in a day than the cattle will eat in two days, I mean of the browſe-wood; and when that is done, kid, and fet it up an end, to preserve it from rotting.

Dr. Plot recommends the disbranching to be done in the spring before felling, whilst the tree is standing; that is, from May to Michaelmas, and so to let it continue till the next spring, and disburden them when felled, as the custom is in Staffordshire and the North, for exceedingly contributing to a dry seasoning, freeing it from the attack of worms and other

accidental corruption; and thinks that the prejudice accruing thereby, as to the Tanner, (in regard of the more difficult excortication) is no way to be put in balance with the advantage and improvement of the timber for paling, building of ships, houses, &c; accounting this method of that universal importance, as to merit the deliberation of a parliament: In the meanwhile, by whatever method you proceed as to this, when once a tree is prostrate, and the bark stripped off, let it so be set as it may be best dry; then cleanse the bole of the branches which were left, and saw it into lengths for the squaring, to which belong the measure and girth, as our workmen call it, which I refer to the buyer, and to many subsidiary books lately printed, wherein it is taught by a very familiar mechanical calculate and easy method.

But by none, in my apprehension, set forth in a more facile and accurate way, than what that industrious mathematician, Mr. Leybourn, has published, in his late *Line of Proportion made Easy*, and other his labours; where he treats as well of the square as the round, as it is applicable to boards and superfcials, and to timber which is hewed, or less rough, in so easy a method, as nothing can be more desired. I know our ordinary Carpenters, &c. have generally upon their rulers a line, which they usually call Gunter's Line; but few of them understand how to work from it as they should: And divers Country Gentlemen, Stewards, and Woodmen, when they are to measure rough timber upon the ground, confide much to the girt, which they do with a string, at about four or five feet distance from the root or great extreme; of the string's length, they take a quarter for the true square, which is so manifestly erroneous, that thereby they make every tree, so measured, more than a fifth part less than really it is. This mistake should therefore be reformed; and it were, I conceive, worth the seller's while to inspect it accordingly: Their argument is, that when the bark of a tree is stripped, and the body hewed to a square, it will then hold out no more measure; that which is cut off being only fit for fuel, and the expence of squaring costs more than the chips are worth. To convince them of this error, I shall refer and recommend them to the above-named author; and to what the industrious Mr. Cooke has so mathematically demonstrated: Where also of taking the altitude of trees, the better to judge of the worth of them, with the measuring of wood-lands; &c. together with necessary calculations for the levelling of ground, and removing of earth, drawing of plots and figures; all which are very conducive to the several arguments of this silvan work. But to proceed:

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If you are to remove your timber, let the dew be first off, and the south wind blow before you draw it; neither should you by any means put it to use for three or four months after, (some not till as many years) unless great necessity urge you, as it did Duilius, who, in the first Punic War, built his fleet of timber before it was seasoned, being not above two months from the very felling to the launching; the navy of Hiero was forty-five days from the forest to the sea, and that of Scipio, in the second Carthaginian War, only forty. July is a good time for bringing home your felled timber; but concerning the time and season of felling, a just treatise might be written: Let the learned therefore consult Vitruvius, particularly on this subject, lib. ii. cap. ix. Also M. Cato, cap. xvii. Plin. lib. xvi. cap. xxxix. Constantinus and Heron. lib. iii. de R. R. Veget. lib. iv. cap. xxxv. Columella, lib. iii. cap. ii. but especially the most ample Theophrastus *φύτων ἱστορίαι* lib. v. Note, That a ton of timber is forty solid feet, and a load fifty.

To make excellent boards and planks, it is the advice of some, you should bark your trees in a fit season, and so let them stand naked a full year before the felling; and in some cases and grounds it may be profitable: But let these, with what has been already said in the foregoing chapters of the several kinds, suffice for this article. I shall add one advertisement of caution to those noble persons and others who have groves and trees of ornament near their houses, and in their gardens in London, and the circle of it, especially if they be of great stature, and well grown, (such as were lately the groves in the several Inns of Court, nay, even that comparatively new plantation in my Lord of Bedford's Garden *, and where-ever they stand in the more interior parts of this city) that they be not over hasty, or by any means persuaded to cut down any of their old trees, upon hope of new more flourishing plantations, thickening, or repairing deformities, because they grew so well when first they were set: It is to be considered how exceedingly that pernicious smoak of the sea-coal is increased in and about London since they were first planted, and the buildings invironing them, and inclosing it in amongst them, which does so universally contaminate the air, that what plantations of trees shall be now begun in any of those places, will have much ado, great difficulty, and require a long time to be brought to any tolerable perfection: Therefore let them make much of what they have; and though I discourage none, yet I can animate none to cut down the old.

* Since the first publication of this discourse, most of those groves and trees have been cut down, to give place for buildings, and turned into streets.

And here might now come in a pretty speculation, what should be the reason after general fellings, and extirpations of vast woods of one species, the next spontaneous succession should be of quite a different sort? We see indeed something of this in our gardens and corn-fields, as the best of poets witnesseth, but that may be much imputed to the alteration, by improvement, or detriment of the soil, and other accidents. Whatever the cause may be, since it appears not from any universal decay of nature, (sufficiently exploded) I shall only here produce matter of fact, and that it ordinarily happens. As in some goodly woods formerly belonging to my grandfather, that were all of Oak, after felling they universally sprung up Beech; and it is affirmed, by general experience, that after Beech, Birch succeeds, as in that famous wood at Darnway, on the river Findorn in the province of Murray in Scotland, where nothing had grown but Oak in a wood three miles in length; and haply more southerly, it might have been Beech, and not Birch till the third degradation. Birches familiarly grow out of old and decayed Oaks; but whence this sympathy and affection should proceed, is more difficult to resolve, in as much as we do not detect any so prolific and eminent seed in that tree. Some accidents of this nature may be imputed to the winds and the birds which frequently have been known to waft and convey seeds to places widely distant, as we have touched in the chapter of Firs. Holly has been seen to grow out of Ash, as Ash out of several trees; and I have it confidently asserted by persons of undoubted truth, that they have seen a tree cut in the middle, whose heart was Ash-wood, and the exterior part Oak, and this in Northamptonshire. And why not as well (though with something more difficulty) as through a Willow, whose body (as is noted) it has been observed to penetrate even to the earth? Detruding the Willow quite out of its place, of which a pretty emblem might be conceived. But I pursue these instances no farther.

The fallen leaves of trees in woods, which lie sometimes very thick and deep, should be raked and shoveled up; being dry, are very useful for the covering of tender kitchen-garden plants, in winter, instead of litter; and the rest, if buried in some hole to rot, when dried and reduced to powder, become excellent mould. I wonder this husbandry is so much neglected.

C H A P. IV.

Of TIMBER, *the* SEASONING *and* USES, *and of* FUEL.

BOOK III.

SEASONING

SINCE it is certain and demonstrable, that all arts and artificans whatsoever must fail and cease, if there were no timber and wood in a nation, (for he that shall take his pen, and begin to set down what art, mystery, or trade belonging any way to human life, could be maintained and exercised without wood, will quickly find that I speak no paradox) I say, when this shall be well considered, it will appear, that we had better be without gold than without timber: This contemplation, and the universal use of that precious material (which yet is not of universal use till it be duly prepared) has moved me to design a solemn chapter for the seasoning, as well as to mention some farther particular application of it. The first and chiefest use of timber was, doubtless, for the building of houses and habitations to shelter men in: It is in the first chapter of the second book, that Vitruvius shews, in what simple and plain manner our first progenitors erected their humble cottages; when, like those of Colchis in Pontus, they began to creep out of the subterranean and cavernous rocks, and laid the first groundfil upon which they placed the upright posts, and rudely framed a pointed roof, *Arboribus perpetuis planis*, (on which the critics have vext their researches) and from which mean beginning, all the superb and pompous effects of architecture have proceeded: But to pursue our title, we have before spoken concerning some preparations of standing trees designed for timber, by a half cutting, disbarking, and the seasons of drawing and using it.

Lay up your timber very dry, in an airy place, (yet out of the wind or sun) and not standing upright, but lying along, one piece upon another, interposing some short blocks between them, to preserve them from a certain mouldiness, which they usually contract while they sweat, and which frequently produces a kind of fungus, especially if there be any fatty parts remaining.

Some there are yet, who keep their timber as moist as they can, by submerging it in water, where they let it imbibe, to hinder the cleaving; and this is good in Fir, both for the better stripping and seasoning; yea, and not only in Fir, but other timber: Lay therefore your boards a fortnight

in the water, (if running, the better, as at some mill-pond head) and then setting them upright in the sun and wind, so as it may freely pass through them, (especially during the heats of summer, which is the time of finishing buildings) turn them daily, and, thus treated, even newly fawn boards will floor far better than a many years dry seasoning, as they call it. But to prevent all possible accidents, when you lay your floors, let the joints be shot, fitted, and tacked down only for the first year, nailing them for good and all the next; and by this means they will lie staunch, close, and without shrinking in the least, as if they were all of one piece; and upon this occasion I am to add an observation which may prove of no small use to builders; that if one take up deal boards that may have lain in the floor an hundred years, and shoot them again, they will certainly shrink (*toties quoties*) without the former method. Amongst Wheel-wrights, the water-seasoning (which hinders the exhaling of the alkali salt in it) causing the hardness, is of especial regard, and in such esteem amongst some, that I am assured the Venetians, for their provision in the arsenal, lay their Oak some years in water before they employ it. Indeed the Turks not only fell at all times of the year, without any regard to the season, but employ their timber green and unseasoned; so that tho' they have excellent Oak, it decays in a short time by this only neglect.

Elm felled ever so green for sudden use, if plunged four or five days in water (especially salt water) obtains an admirable seasoning, and may immediately be used. I the oftener insist on this water-seasoning, not only as a remedy against the worm, but for its efficacy against warping and distortions of timber, whether used within, or exposed to the air. Some again commend burying in the earth, others in wheat; and there be seasonings of the fire, as for the scorching and hardening of piles, which are to stand either in the water or the earth:

Et suspensa focus explorat robora fumus.

GEORG. i.

————— the Oak

Explore, suspended in the chimney smoke:

For that to most timber it contributes much to its duration. Thus do all the elements contribute to the art of seasoning. The learned Interpreter of Antonio Neri's Art of Glafs, cap. v. speaking of the difference of vegetables, as they are made use of at various seasons, observes from the

U u u

BOOK III.

Button-mould-makers, in those woods they use, that Pear tree, cut in summer, works toughest, but Holly in the winter; Box hardest about Easter, but mellow in the summer; Hawthorn kindly about October, and Service tree in summer.

And yet even the greenest timber is sometimes desirable for such as carve and turn, but it choaks the teeth of our saws; and for doors, windows, floors, and other close works, it is altogether to be rejected, especially where Walnut tree is the material, which will be sure to shrink: Therefore it is best to choose such as is of two or three years seasoning, and that is neither moist nor over dry; the mean is best. Sir Hugh Platt informs us, that the Venetians use to burn and scorch their timber in a flaming fire, continually turning it round with an engine, till they have gotten upon it an hard, black, coaly crust, and the secret carries with it great probability; for the wood is brought by it to such a hardness and dryness, *ut cum omnis putrefactio incipiat ab humido*, that neither earth nor water can penetrate it; I myself remembering to have seen charcoal dug out of the ground amongst the ruins of antient buildings, which had in all probability lain covered with earth above fifteen hundred years.

Timber which is cleft is nothing so obnoxious to rift and cleave as what is hewn; nor that which is squared, as what is round: and therefore where use is to be made of huge and massy columns, let them be bored through from end to end; it is an excellent preservative from splitting, and not unphilosophical; though to cure this accident painter's putty is recommended, also the rubbing them over with a wax-cloth is good; or before it be converted, the smearing the timber over with cow-dung, which prevents the effects both of sun and air upon it, if of necessity it must lie exposed: But besides the former remedies, I find this, for the closing of the chops and clefts of green timber, to anoint and supple it with the fat of powdered-beef broth, with which it must be well soaked, and the chafins filled with sponges dipt into it; this to be twice done over. Some Carpenters make use of grease and saw-dust mingled; but the first is so good a way, says my author, that I have seen wind-shock timber so exquisitely closed, as not to be discerned where the defects were: This must be used when the timber is green.

We spake before of squaring; and I would now recommend the quartering of such trees as will allow useful and competent scantlings, to be of

much more durableness and effect for strength, than where (as custom is, and for want of observation) whole beams and timbers are applied in ships or houses, with slab and all about them, upon false suppositions of strength beyond these quarters: For there is in all trees an evident interstice, or separation between the heart and the rest of the body, which renders it much more obnoxious to decay and miscarry, than when they are treated and converted as I have described it; and it would likewise save a world of materials in the building of great ships, where so much excellent timber is hewed away to spoil, were it more in practice. Finally:

I must not omit to take notice of the coating of timber in work, used by the Hollanders, for the preservation of their gates, portcullises, draw-bridges, sluices, and other huge beams and contignations of timber exposed to the sun and perpetual injuries of the weather, by a certain mixture of pitch and tar, upon which they strew small pieces of cockle, and other shells, beaten almost to powder, and mingled with sea-sand, or the scales of iron, beaten small and sifted, which incrusts, and arms it after an incredible manner against all these assaults and foreign invaders; but if this should be deemed more obnoxious to firing, I have heard that a wash made of allum has wonderfully protected it against the assaults even of that devouring element; and that so a wooden tower or fort at the Piræum, an Athenian Port, was defended by Archelaus, a Commander of Mithridates, against the great Sylla: But you have several compositions for this purpose in that incomparable Treatise of Naval Architecture, written in the Low-Dutch by N. Witsen, part i. chap. v. The book is in folio, and he that should well translate it into our language (which I much wonder has not yet been done) would deserve well of the publick.

Timber that you have occasion to lay in mortar, or which is in any part contiguous to lime, as doors, window-cases, groundfils, and the extremities of beams, &c. have sometimes been capped with molten pitch, as a marvellous preserver of it from the burning and destructive effects of the lime; but it has since been found rather to heat and decay them, by hindering the transudation which those parts require; better supplied with loam or strewings of brick-dust, or pieces of boards; some leave a small hole for the air. But tho' lime be so destructive whilst timber lies thus dry, it seems they mingle it with hair, to keep the worm out of ships which they sheath for southern voyages; though it is held much to retard

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their course: Wherefore the Portugueze scorch them with fire, which often proves very dangerous; and indeed their timber being harder, is not so easily penetrable; and therefore have some been thinking of finding out some tougher sorts of materials, especially of a bitter sap; such as is reported to be the wood of a certain Indian Pear: and some talk of a lixivium to do the feat; others of a pitchy substance to be extracted out of sea-coal; but nothing has yet been found more expedient, than the late application of thin lamins of sheet-lead, if that also be no impediment to sailing: However, there are many kinds of wood in the Western-Indies (besides the Acajou) that breed no worms, and such is the White-Wood of Jamaica, proper enough to build ships. In the mean time, let me not omit what the learned Dr. Lister, in his Notes upon Godarius of Insects, says, That he is persuaded there could not be a more probable expedient to discover what kind of timber were best for sheathing, than to tie certain polished pieces of wood (cut like tallies) to a buoy, in some waters and streams much infested with the worms; for that sort of wood which the worm should refuse, would in all reason be chosen for the use desired. The Indies being stored with greater varieties of timber than Europe, it were probable there might some be found, which that kind of river-worm will never attack.

For all uses, that timber is esteemed the best which is the most ponderous, and which, lying long, makes deepest impression in the earth, or in the water, being floated; also what is without knots, yet firm, and free from sap; which is that fatty, whiter, and softer part, called by the ancients Alburnum, which you are diligently to hew away: Here we have much ado about the Torulus of the Fir and the Φλοιώδης κύλας, by both Vitruvius and Theophrastus, which I pass over. You shall perceive some which has a spirial convolution of the veins; but it is a vice proceeding from the severity of unseasonable winters, and defect of good nutriment.

My Lord Bacon, Exper. 658, recommends for trial of a sound or knotty piece of timber, to cause one to speak at one of the extremes to his companion listening at the other; for if it be knotty, the sound, says he, will come abrupt.

Moreover, it is expedient that you know which are the veins and which the grain in timber, (whence the term *fluviani arborem*) because of the difficulty of working against it: Those therefore are counted the veins

which grow largeſt, and are ſofter, for the benefit of cleaving and hewing; that the grain, or peſtines, which runs in waves, and makes the diverſe and beautiful chamfers which ſome woods abound in to admiration. The Fir tree, horizontally cut, has two circles of different fibres, which (when the timber comes to be cleft in the middle) ſeparate into four different waves, whence Pliny calls them *quadrifluvius*, and it is to be noted, that the nodous, and knotty part of theſe ſort of trees, is that only which grows from the firſt boughs to the ſummit, or top, by Vitruvius termed the *Fuſterna*, which both Baldus and Salmaſius derive à *Fuſte*. The other clear part, free of theſe boils, (being that which, when the ſappy ſlab is cut away, is the beſt) he calls *Sapinea*. Finally, the grain of Beech runs two contrary ways, and is therefore to be wrought accordingly; and indeed the grain of all timber ought well to be obſerved; ſince the more you work according to it, eſpecially in cleaving, and the leſs you ſaw, the ſtronger will be your work.

Here it may be fitly enquired, whether of all the ſorts we have enumerated, the old or the younger trees do yield the faireſt colour, pleaſanteſt grain, and gloſs for wainſcot, cabinets, boxes, gun-ſtocks, &c. and what kind of Pear and Plum tree give the deepeſt red, and approaches neareſt in beauty to Braſil. It is affirmed the old Oak, old Walnut, and young Aſh, are beſt for moſt uſes, and yet for ſhip-carpentry this does not always hold; nor does the bigneſs of it ſo much recommend it, becauſe it is commonly a ſign of age, which (like to very old men) is often brittle and effete. Black and thorny Plum tree is of the deepeſt Oriency; but whether theſe belong to the foreſt, I am not yet ſatiſfied, and therefore have assigned them no chapter apart. But now I ſpeak of the Plum tree, I am aſſured by a worthy friend, that the gum thereof diſſolved in vinegar, has cured the moſt contumacious tetters, when all other remedies, outward or inwardly applied, nothing availed.

Laſtly, I would alſo add ſomething concerning what woods are obſerved to be moſt ſonorous for muſical inſtruments: We as yet detect few but the German Aer, which is a ſpecies of Maple, for the rims of viols, and the choiceſt and fineſt grained Fir for the bellies: The finger-boards, back, and ribs, I have ſeen of Yew, Pear tree, &c. but Pipes, Records, and Wind-Inſtruments, are made both of hard and ſoft woods. I had lately an organ with a ſet of Oaken pipes, which were the moſt ſweet and mellow that were ever heard; it was a very old inſtrument, and formerly, I think, belonging to the Duke of Norfolk.

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For the place of growth, that timber is esteemed best which grows most in the sun, and on a dry and hale ground; for those trees which suck, and drink little, are most hard, robust, and longest lived. Instances of sobriety. The climate contributes much to its quality, and the northern situation is preferred to the rest of the quarters; so as that which grew in Tuscany was, of old, thought better than that of the Venetian side; and yet the Biscay timber is esteemed better than what they have from colder countries; and trees of the wilder kind, and barren, than the over-much cultivated and great bearers. But of this already.

To omit nothing, authors have summed up the natures of timber, as the hardest, Ebony, Box, Larch, Lotus, Terebinth, Cornus, Yew, &c. and tho' these indurated woods be too ponderous for ship-carpentry, yet there have been vessels built of them by the Portugueze in America; in which the planks and innermost timbers had been sawed very thin for lightness sake, and the knee-timber put together of divers small pieces, by reason of the inflexibleness of it, both which could not but render the ships very weak: In the mean time, the perfection of these hard materials consists much in their receiving the most exquisite politure; and for this, Linseed, or the sweeter Nut-oil, does the effect best: Pliny gives us the receipt, with a decoction of Walnut-shells, and certain wild Pears. Next to these, Oak for ships and houses, (or more minutely) the Oak for the keel, the Robur for the prow, Walnut the stern, Elm the pump. Then for bucklers and targets were commended the more soft and moist, because apt to close, swell, and make up their wounds again; such as Willow, Lime, Birch, Alder, Elder, Ash, Poplar, &c.

The Robur, or Wild Oak timber, is best to stand in ground; the *Quercus* without; and our English, for being least obnoxious to splinter, and the Irish for resisting the worm, (tough as leather) are doubtless, for shipping, to be preferred before all other. The Cyprus, Fir, Pines, Cedar, &c. are best for posts and columns, because of their erect growth, natural and comely diminutions. Then again it is noted, that Oriental trees are hardest towards the cortex or bark, our western towards the middle, which we call the Heart; and that trees which bear no fruit, or but little, are more durable than the more pregnant. It is noted of Oak, that the knot of an inveterate tree, just where a lussy atm joins to the stem, is as curiously veined as the Walnut, which being omitted in the chapter of the Oak, I here observe. The Palmeto growing to that prodigious height in the Bar-

badoes, and whose top bears an excellently tasted Cabbage, grows so wonderfully hard, that an edge-tool can scarce be forced into it.

Pines, Pitch, Alder, and Elm are excellent to make pumps and conduit-pipes, and for all water-works, &c. Fir for beams, bolts, bars, being tough, and not so apt to break as the hardest Oak: In sum, the more odoriferous trees are the more durable and lasting; and yet I conceive that well-seasoned Oak may contend with any of them, especially if either preserved under ground, or kept perfectly dry. In the mean time, as to its application in shipping, the best of it ought to be employed for the keel, (that is, within, else Elm exceeds) the main beams and rafters, whilst for the ornamental parts, much slighter timber serves. One note more is requisite, namely, that great care be had to make the Trundles of the best, toughest, and sincerest part, many a vessel having been lost upon this account; and therefore dry and young timber is to be preferred for this, and for which the Hollanders are plentifully furnished out of Ireland, as Nicholas Witsen has himself acknowledged.

Is it not, after all this, to be deplored, that we, who have such perpetual use and convenience for ship-timber, should be driven to procure of foreign stores, so many thousand loads, at intolerable prices? But this we are obliged to do from the eastern countries, as far as Norway, Poland, Prussia, Dantzick, and farther, even from Bohemia, though greatly impaired by stopping so long in the passage: But of this our most industrious and worthy friend Mr. Pepys (late Secretary of the Admiralty) has given a just and profitable account in his Memoirs.

Here farther for the uses of timber, I will observe to our reader some other particulars, for direction both of the seller and buyer, applicable to the several species: And first of the two sorts of Lathes allowed by statute, one of five, the other of four feet long, because of the different intervals of rafters: That of five has one hundred to the bundle; that of four, one hundred and twenty, and should be in breadth one inch and half, and half an inch thick: of either of which sorts there are three, viz. Heart-oak, Sap-lathes, and Deal-lathes, which also differ in price: The Heart-oak are fittest to lie under tiling; the second sort for plastering of side-walls; and the third for ceilings, because they are straight and even.

Here we will gratify our curious reader with as curious an account of the comparative strength and fortitude of the several usual sorts of timber,

BOOK III. as upon suggestions, previous to this work, it was several times experimented by the Royal Society, though omitted in the first impression, because the trials were not compleat as they now thus stand in our register.

MARCH 23, 1663.

The experiment of breaking several sorts of wood was begun to be made: and there were taken three pieces of several kinds, of Fir, Oak, and Ash, each an inch thick, and two feet long; the Fir weighed $8\frac{1}{2}$ ounces, and was broken with two hundred pounds weight; the Oak weighed $12\frac{1}{2}$ ounces, broken with two hundred and fifty pounds weight; the Ash weighed $10\frac{1}{2}$ ounces, broken with three hundred and twenty-five pounds weight.

Besides, there were taken three pieces of the same sort of wood, each of half an inch thick, and one foot long; the Fir weighed one ounce, and was broken with five eighths of an hundred; the Oak weighed $1\frac{1}{2}$ ounces, broken with five eighths of an hundred; the Ash weighed $1\frac{1}{2}$ ounces, broken with an hundred pounds.

Again; there was a piece of Fir half an inch square, and two feet long, broken with thirty-three pounds; a piece of half an inch thick, one inch broad, and seven feet long, broken with one hundred weight edge-wise; and a piece of half an inch thick, and one and a half broad, and two feet long, broken with one hundred and twenty-five pounds weight, also edge-wise.

The experiment was ordered to be repeated, and recommended by the President to Sir William Petty and Dr. Hook; and it was suggested by some of the company, that in these trials consideration might be had of the age, knottiness, solidity, several soils, and parts of trees, &c. and Sir Robert Murray did particularly add, that it might be observed how far any kind of wood bends before it breaks.

MARCH—1664.

The operator gave an account of more pieces of wood broken by weight, viz. a piece of Fir four feet long, two inches thick, and fifty-three ounces Weight, broken with eight hundred pounds weight, and very little bending with seven hundred and fifty; by which the hypothesis seems to be confirmed, that in similar pieces the proportion of the breaking-weight is according to the basis of the wood broken. Secondly, of a piece of Fir two

feet long, one inch square, cut away from the middle both ways to half an inch, which supported two hundred and fifty pounds weight before it broke, which is more by fifty pounds than a piece of the same thickness every way was formerly broken with; the difference was guessed to proceed from the more firmness of this other piece.

His Lordship, the President, was desired to contribute to the prosecution of this experiment, and particularly to consider what line a beam must be cut in, and how thick it ought to be at the extreme, to be equally strong, which was brought in April 13, but I find it not entered.

APRIL 20, 1664.

The experiment of breaking wood was prosecuted, and there were taken two pieces of Fir, each two feet long, and one inch square, which were broken, the one long-ways with three hundred pounds weight, the other transverse-ways with two hundred and fifty pounds: Secondly, two pieces of the same wood, of each three-quarters of an inch square, and two feet long, broken, the one long-ways with one hundred and twenty-five; the other transverse with one hundred pounds weight: Thirdly, one piece of two feet long and half an inch square, broken long-ways with eighty-one pounds: Fourthly, one piece cut out of a crooked Oaken biller, with an arching grain, about three quarters of an inch square, and two feet long, broken with seventy-five pounds.

JUNE 29, 1664.

There were made several experiments more of breaking wood: First, a piece of Fir, half an inch diameter, and three inches long, at which distance the weight hung, broke in the plane of the grain horizontally, with sixty-six pounds and three-quarters, whereof fifteen pounds troy; vertically, with two pounds more. Also Fir of one quarter of an inch diameter, and an inch and a half long, broke vertically with twenty pounds, and horizontally with nineteen pounds. Elm of half inch diameter, and three inches long, broke horizontally with forty-seven pounds; vertically with twenty-three pounds. Elm a quarter of an inch diameter, and an inch and a half long, broke horizontally with twelve pounds; vertically with twelve pounds, which is note-worthy.

JULY 6, 1664.

The experiment of breaking woods prosecuted: A piece of Oak of half an inch diameter, and three inches long, at which distance the weight

X x x

BOOK III.

hung, broke horizontally with forty-eight pounds; vertically with forty pounds. Ash of half an inch diameter, and three inches long, horizontally with seventy-seven pounds; vertically with seventy-five pounds. Ash of half an inch diameter, and an inch and a half long, horizontally with nineteen pounds; vertically with ten pounds.—Thus far the Register.

In the mean time I learn, that in the mines of Mendip, pieces of timber, of but the thickness of a man's arm, will support ten tun of earth; and that some of it has lain two hundred years, which is yet as firm as ever, growing tough and black; and being exposed two or three days to the wind and sun, scarce yields to the ax.

Here might come in the Problems of Cardinal Cusanus, in lib. iv. *Idiotæ dial.* 4to, concerning the different velocity of the ascent of great pieces of timber, before the smaller, submerg'd in water, as also of the weight; as *v. g.* Why a piece of wood an hundred pounds weight, poising more in the air than two pounds of lead, the two pounds of lead should seem to weigh (he should say sink) more in the water*? Why fruits, being cut off from the tree, weigh heavier than when they were growing? With several like paradoxes, haply more curious than useful, and therefore we purposely omit them; but so may we not the recommendation of that useful Treatise of Duplicate Proportion, together with a new Hypothesis of Elastic or Springy Bodies, to shew the strengths of timbers, and other homogeneous materials applied to buildings, machines, &c. as it is published by that admirable Genius, the learned Sir William Petty: To which we join that part of Dr. Grew's Comparative Anatomy of Trunks, as variously fitted for mechanical uses; where that most industrious and curious searcher into Nature, describes to us whence woods are soft, fast, hard, apt to be cleft, tough, durable, &c.

* Of the Specific Gravity of timber in proportion to water, see the table in the Philosophical Transactions, n. 169, and 299.

Lastly, Concerning squared and principal timber, for any usual buildings, these are the legal proportions, and which builders ought not to vary from.

Summers or girders from	{ F. F. }		In length, must be in their square,	{ In. In. }		Joys of	{ Feet 11½ in length must be in their 10½ square		{ In. In. }	
	14	16		11	8		11½ in length must be in their 10½ square		8	3
	18 to 20			13 &	9				7	and 3
	20	23		14	10				6	— 3
	23	26		16	12					
	26	28		17	14					

Binding Joysts and Trimmers from	{ F. F. }	In length must be in their square	{ 6 5 7 & 5 8 5 }	Wall-plates and beams of any length, from feet, may have in their square	{ In. In. 7 5 10 & 6 8 6 }	CHAP. IV.

Purlynes from	{ F. F. }	In length, must have in their square	{ 9—8 & 12—9 }

Principal rafters cut taper from	{ F. F. }	In length, must have in their square on one side	{ In. In. 8 5 9 7 10 to 8 12 9 9 9 }	On the other side	{ Single rafters in length from 6½ to 9½— }	{ F. must have in their squ. }	{ 5-3½ & 5-4 }	
								12½ 14½
								14½ 18½
								18½ to 21½
								21½ 24½

Principal dischargers of any length from	{ Feet 10 upward }	{ must have in their square }	{ Inch. Inch. 13 — 12 16 — 13 }	

But Carpenters also work by square, which is ten feet in framing and erecting the carcase, as they call it, of any timber edifice, which is valued according to the goodness and choice of the materials, and curiosity in framing, especially roofs and stair-cases, which are of most charges. And here might also something be added concerning the manner of framing the carcases of buildings, as of floors, pitch of roofs, the length of hips and sleepers, together with the names of all those several timbers used in fabricks totally consisting of wood; but I find it done to my hand, and published some years since, at the end of a late Translation of the first Book of Palladio, to which I refer the reader. And to accomplish our artist in timber, with the utmost which that material is capable of, I do recommend him to the study and contemplation of that stupendous roof, which now lies over the renowned Sheldonian Theatre at the University of Oxford; being the sole work and contrivement of my most Honoured Friend, Sir Christopher Wren, now worthily dignified with the superintendency of the Royal Buildings. See Dr. Plot's description of it in his Natural History of Oxfordshire, 272, 273, tab. 13, 14; also Dr. Wallis de Motu, part iii. de Vecte, cap. vi. prop. 10.

Other conversions there are of timber, of all lengths, sizes, and dimensions, for arches, bridges, floors, and flat-work, (without the supports of

BOOK III. pillars) tables, cabinets, inlayings, and carvings, skrews &c. with the art of Turning, to the height of which divers Gentlemen have arrived, and, for their diversion; produced pieces of admirable invention and curiosity: These, I say, belonging to the mechanick uses of timber, might enter here, with a catalogue of innumerable models and other rarities (to be found in the repositories and collections of the curious): But let this suffice.

We did, in book ii. chap. i. mention certain subterranean trees, which Mr. Camlden supposes grew altogether under the ground: And truly it did appear a very paradox to me, till I both saw, and diligently examined that piece (plank, stone, or both shall I name it?) of *Lignum Fossile* taken out of a certain quarry thereof at *Aqua Sparta*, not far from Rome, and sent to the most incomparably learned Sir George Ent, by that obliging Virtuoso Cavalier dal Pozzo. He that shall examine the hardness, and feel the ponderousness of it, sinking in water, &c. will easily take it for a stone; but he that shall behold its grain, so exquisitely undulated and varied, together with its colour, manner of hewing, chips, and other most perfect resemblances, will never scruple to pronounce it arrant wood.

Signor Stelluti, an Italian, has published a whole Treatise expressly to describe this great curiosity: And there has been brought to our notice a certain relation of an Elm growing in Berkshire, near Farringdon, which being cut towards the root, was there plainly petrified; the like, as I once myself remember to have seen in another tree, which grew quite through a rock near the sepulchre of Agrippina (the mother of that monster Nero) at the Baia by Naples, which appeared to be all stone, and trickling down in drops of water, if I forget not. But whilst others have philosophized, according to their manner, upon these extraordinary concretions, see what the most industrious and knowing Dr. Hook, Curator of this Royal Society, has with no less reason, but more succinctness, observed from a late microscopical examen of another piece of petrified wood; the description and ingenuity whereof cannot but gratify the curious, who will, by this instance, not only be instructed how to make enquiries upon the like occasions, but see also with what accurateness the Society constantly proceed in all their indagations and experiments; and with what candour they relate, and communicate them.

It resembled wood, in that

“ First, All the parts of the petrified substance seemed not at all dislocated or altered from their natural position while they were wood; but the whole piece retained the exact shape of wood, having many of the conspicuous pores of wood still remaining, and shewing a manifest difference, visible enough between the grain of the wood and that of the bark; especially, when any side of it was cut smooth and polite; for then it appeared to have a very lovely grain, like that of some curious close wood.

“ Next, it resembled wood in that all the smaller and (if so I may call those which are only to be seen by a good glass) microscopical pores of it appeared (either when the substance was cut and polished transversely, or parallel to the pores) perfectly like the microscopical pores of several kinds of wood, retaining both the shape and position of such pores.

“ It differed from wood,

“ First, in weight; being to common water, as $3\frac{1}{4}$ to 1; whereas there are few of our English woods that, when dry, are found to be so heavy as water.

“ Secondly, in hardness; being very near as hard as flint, and in some places of it also resembling the grain of a flint; it would very readily cut glass, and could not, without difficulty, (especially in some parts of it) be scratched by a black hard flint; it would readily strike fire against a steel, as also against a flint.

“ Thirdly, in the closeness of it; for, though all the microscopical pores of the wood were very conspicuous in one position; yet, by altering that position of the polished surface to the light, it also was manifest that those pores appeared darker than the rest of the body, only because they were filled up with a more dusky substance, and not because they were hollow.

“ Fourthly, in that it would not burn in the fire; nay, though I kept it a good while red-hot in the flame of a lamp, very intensely cast on it by a blast thro’ a small pipe, yet it seemed not at all to have diminished its extension; but only I found it to have changed its colour, and to have put on a more dark and dusky brown hue: Nor could I perceive

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“ that those parts which seemed to have been wood at first, were any thing
 “ waisted, but the parts appeared as solid and close as before. It was far-
 “ ther observable, that as it did not consume like wood, so neither did it
 “ crack and fly like a flint, or such like hard stone; nor was it long be-
 “ fore it appeared red hot.

“ Fifthly, in its dissolubleness; for putting some drops of distilled vine-
 “ gar upon the stone, I found it presently to yield very many bubbles, just
 “ like those which may be observed in spirit of vinegar when it corrodes
 “ coral; though I guess many of those bubbles proceeded from the small
 “ parcels of air which were driven out of the pores of this petrified sub-
 “ stance, by the insinuating liquid menstruum.

“ Sixthly, in its rigidity and friability; being not at all flexible, but
 “ brittle like a flint; inasmuch, that with one knock of a hammer I broke
 “ off a small piece of it, and with the same hammer quickly beat it to
 “ pretty fine powder upon an anvil.

“ Seventhly, it seemed also very differing from wood to the touch, feel-
 “ ing more cold than wood usually does, and much like other close stones
 “ and minerals.

“ The reason of all which phenomena seems to be,

“ That this petrified wood, having lain in some place where it was well
 “ soaked with petrifying water (that is, such a water as is well impregna-
 “ ted with stony and earthy particles) did by degrees separate, by straining
 “ and filtration, or, perhaps, by precipitation, cohesion, or coagulation,
 “ abundance of stony particles from that permeating water; which stony
 “ particles having, by means of the fluid vehicle, conveyed themselves
 “ not only into the microscopical pores, and perfectly stopped them up, but
 “ also into the pores, which may perhaps be even in that part of the wood
 “ which thro’ the microscope appears most solid, did thereby so augment
 “ the weight of the wood, as to make it above three times heavier than
 “ water, and perhaps six times as heavy as it was when wood: Next, they
 “ hereby so lock up and fetter the parts of the wood, that the fire cannot
 “ easily make them fly away, but the action of the fire upon them is only
 “ able to char those parts as it were; like as a piece of wood, if it be
 “ closed very fast up in clay, and kept a good while red hot in the fire,
 “ will, by the heat of the fire, be charred, and not consumed; which may

“perhaps be the reason why the petrified substance appeared of a blackish brown colour after it had been burnt. By this intrusion of the petrified particles, it also becomes hard and friable; for the smaller pores of the wood being perfectly stuffed up with these stony particles, the particles of the wood have few or no pores in which they can reside; and, consequently, no flexion or yielding can be caused in such a substance. The remaining particles likewise of the wood among the stony particles, may keep them from cracking and flying, as they do in a flint.”

The casual finding of subterraneous trees has been the occasion of this curious digression, besides what we have already said in chap. i. book ii. Now it were a strange paradox to affirm, that the timber under the ground should, to a great degree, equal the value of that which grows above the ground; seeing, though it be far less, yet it is far richer, the roots of the vilest shrub being better for its toughness, and, for ornament and delicate uses, much more preferable than the heart of the fairest and soundest tree: And many hills and other waste places, that have in late and former ages been stately groves and woods, have yet this treasure remaining, and perchance sound and unperished, and commonly (as we observed) an hindrance to other plantations; engines therefore, and expedients for the more easily extracting these cumbrances, and making riddance upon such occasions, besides those we have produced, should be excogitated and enquired after, for the dispatch of this difficult work.

From all these instances we may gather the necessity of a more than ordinary study and diligence in those whose profession obliges them to deal in timber; nor is it a small stock of philosophy that will enable them to skill in the nature and properties of this material, which not only concerns the Architects themselves, but their Subsidiaries, viz. Carpenters, Joiners, and especially Wood-Brokers. I cannot therefore but take notice, that among the antient Sportulæ*, bequeathed by several Founders and Foun-

N O T E S.

* Pliny, in lib. xix. cap. ii. describes a plant called *Spartum*, of which, when macerated, ropes were made, and which in its natural state was applied to various domestic purposes. Of this Livy too says, that Asdrubal had laid up a considerable quantity for the service of his fleet. See lib. xxii. cap. xx. It is probably from this plant that the terms *Sporta*, *Sportula*, &c. are derived, for it appears to have been very proper for the purpose of making baskets. *Sportula* is literally a little basket, and, in

Book III. dresses for the encouragement of Gardeners, there was a College or Hall, not unlike that of our Carpenters, where, upon a certain day, the fraternity not only met to feast, but, doubtless, to confer and edify one another, as appears by an antient inscription of the Dendrophori at Puteoli, mentioned by the learned Dr. Spon *, which, for the honour of our present Discourse, we subjoin :

* Miscell.
Erudit. An-
tiq. Sect. 11.
Art. xi.

EX S.C. DENDROPHORI CREATI QVI SVNT
SVB CVRA XV VIR ST. CCVV
PATRON. L. AMPIVS STEPHANVS SAC.
M. DEI QQ. DEND. DEDICATIONI HVIVS
PANEM VINVM ET SPORTVLAS DEDIT

C. VALERIVS PICENTINVS LONGINIVS IVSTINVS
C. IVLIVS HERCVLANVS A. FIRMIVS POLYBIVS

The Jews had their feast of *Συναγωγία*, mentioned by Josephus, in which they were obliged to carry wood to the temple for the maintaining the fires of the altar.

With many others, (a numerous catalogue of Consuls names) it being, it seems, a corporation established by the state, when they carried boughs and branches of trees in procession, and distributed a Sportula of bread and wine: But of this, and of the Fabri Tignarii, Naupegarii, (Ship-Carpenters) and Centonarii, see this learned man's excellent dissertation.

N O T E S.

the Roman *clasics*, signifies a distribution, sometimes of victuals, because they were given in such baskets, and sometimes of money. The distinction of *Patroni* and *Clientes* formed an essential part of the Roman political constitution; and whenever the latter had been employed in doing honour to their Patrons, it had been customary from early times to entertain them at supper, which among the Romans was the principal meal. This custom, it seems, continued to the reign of Nero; for Suetonius, lib. vi. cap. xvi. tells us, that Nero changed the public suppers into Sportulæ, which from Juvenal. sat. i. v. 95, appear to have been a distribution of victuals in the porch or front of the Patron's house. Afterwards, instead of victuals, a small sum of money, forty quadrantes, which were a coin of brass or lead, in value something less than a halfpenny each, was given, still under the name of Sportula, as appears from Martial, lib. iii. epig. vii.—Domitian at first seems to have pursued the practice of Nero; for it appears from Suetonius, lib. viii. cap. iv. that on a certain solemn occasion he gave victuals to the Senate and the Knights in Panaria, and to the common people in Sportellæ. The Panaria probably were vessels of a larger size, or more elegant materials than the Sportellæ. Afterwards, however, Domitian restored the antient custom of treating the Clients with a full meal, as we are informed by Suetonius, lib. viii. cap. vii. as well as by Martial, lib. viii. epig. l. v. 10. In this passage Martial opposes the Spor-

These colleges or halls were dedicated to Diana, as Goddes of the Woods, of which another Roman inscription is yet extant : CHAP. IV.

DIANAÆ.
COLLEG. NAUPEGIAR.
M. JUNIUS. BALISTUS.
ET. Q. AVILLIUS. EROS.
II. VIR. D.D.

For the use of our chimneys, and maintenance of fire, the plenty of wood for fuel, rather than the quality, is to be looked after; and yet there are some greatly to be preferred before others, as harder, longer lasting, better heating, and more chearfully burning; for which we have commended the Ash, &c. in the foregoing paragraphs, and to which I pretend not here to add much for the avoiding repetitions, though even an history of the best way of charring would not misbecome this discourse.

But something more is to be said, sure, concerning the felling of *Lignum*, fuel-wood; for so critics would distinguish it from *Materia*, timber. Benedictus Cursius, Hortor. lib. viii. cap. xi. reckons up what woods

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stula to what he calls *restia cœna*, which it seems is what he meant, in the preceding quotation where he makes a like distinction, by the term *salarium*, that is, victuals for a day. It appears that among the Romans largesses of victuals or of money were very common upon solemn occasions, such as marriages, entering on public offices, or the like.—Claudius, we are told, jocularly gave the name of Sportula to a small exhibition of Gladiators, without preparation, and that continued but for a short time, because, says Suetonius, *primum daturus edixerat velut ad subitam condictamq; cœnulam invitare se populum*: he said he would give them such an entertainment as if the people had invited themselves to a short and hasty supper, lib. v. chap. xxi.—The younger Pliny, in Book x. ep. cxvii. writes from Bithynia to Trajan to ask the Emperor's opinion concerning the custom that prevailed there of distributing a Denarius or two, a coin in value about sevenpence, on occasion of taking the manly robe, of entering on a magistracy, or dedicating a public work, which largesses the critics on this author have not hesitated to call Sportulæ, probably with sufficient reason, though that word does not occur in the epistle, notwithstanding that it has been referred to by some authors as justifying the application of this term in the very extensive sense of any kind of gift on any public occasion.—In the Greek Glosses, Sportula is rendered sometimes a distribution in general, sometimes a distribution of a little piece of gold, sometimes a distribution of silver.

Y y

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* V. Eustath.
in Odyss. iii.

make the best firing: Also of coaling, *et de facibus*, clearing, and what else belongs to *ξύλοισιναί*, especially for the use of sacrifices*, which had their particular sorts, as in the temple Despoene in Arcadia, where they were prohibited the burning of Olive-wood, the Vaticinatric Laurel, *Φύλον Μαινίδον*, the Thick-rind Oak, or any fungous, or rotten wood, but were obliged to use what was well dried, and apt to kindle without smoaking. In the sacrifice of Jupiter they used White Poplar, and the Pine on the Altar of Ceres. The Persian Magi burnt their sacrifices with Myrtle and the boughs of Laurel, and, in general, all the sacrifices offered up to the Pagan Gods were lighted with that wood which was sacred to the particular Deity. Of all which to particularize, let the curious inquire. We proceed therefore with what concerns this most useful chapter.

And first, that our Fuelist begin with the under-wood: Some conceive between Martinmas and Holy-Rood; but generally with Oak as soon as it will strip, but not after May; and for Ashes, betwixt Michaelmas and Candlemas. Let these be so felled as that the cattle may have the browsing of them, for in winter they will not only eat the tender twigs, but even the very moss; but fell no more in a day than they can eat for this purpose. This done, kid or bavin them, and pitch them upon their ends, to preserve them from rotting: Thus the under-wood being disposed of, the rest will prosper the better; and besides, it otherwise does but rot upon the earth, and destroy that which would spring. If you head or top for the fire, it is not amiss to begin three or four feet above the timber, if it be considerable: but in case they are only shaken trees and hedge-rows, strip them even to thirty feet high, because they are usually full of boughs; and it were good to top such as you perceive to wither at the tops a competent way beneath, to prevent their sickness downwards, which will else certainly ensue; whereas by this means even dying-trees may be preserved many years to good emolument, though they never advance taller; and being thus frequently shred, they will produce more than if suffered to stand and decay: This is a profitable note for such as have old, doating, or anyways infirm wood. In other fellings, some advise never to commence the disbranching from the top; for though the incumbency of the very boughs upon the next cause them to fall off the easier, yet it endangers the splicing of the next, which is very prejudicial, and therefore advise the beginning at the nearest. And in cutting for fuel, you may as at the top, so at the sides, cut a foot or more from the body; but never when you shred timber-trees. We have said how dangerous it is to

cut for fire-wood when the sap is up; it is a mark of improvident husbandry; besides, it will never burn well, though abundance be congested. Lastly, remember that the east and north winds are unkind to the succeeding shoots.

Thus we have endeavoured to prescribe the best directions we could learn concerning this necessary subject. And in this penury of that dear commodity, and to incite all ingenious persons, studious of the benefit of their country, to think of ways how our woods may be preserved, by all manner of arts which may prolong the lasting of our fuel, I would give the best encouragements. Those that shall seriously consider the intolerable misery of the poor Cauchi (the then inhabitants of the Low-Countries) described by Pliny, lib. xvi. cap. i. (how opulent soever their late industry has rendered them) for want only of wood for fuel, will have reason to deplore the excessive decay of our former store of that useful commodity; and by what shifts our neighbours, the Hollanders, do yet repair that defect, be invited to exercise their ingenuity: The process of which is casting the die, or square of the turf, in four equal quarters; and to build them so up, (as our brick-makers do their crude ware) that they may have the free intercourse of the air till they are dry. See Quicciardius, in his Description of Holland, or Du Cange's Glossary, verbo Turba. But besides the dung of beasts*, and the peat and turf (which we may find in our ouzy lands and heathy commons) for their chimnies, they make use of stoves, both portable and standing; and truly the more frequent use of those inventions in our great wasting cities, (as the custom is through all Germany) as also of those new and excellent ovens invented by Dr. Kessler, for the incomparably baking of bread, &c. would be an extraordinary expedient of husbanding our fuel, as well as the right mingling, and making up of charcoal-dust and loam, as it is hinted to us by Sir Hugh Platt, and is generally used in Maestricht, Liege, and the country about it, than which there is not a more sweet, lasting, and beautiful fuel. The manner of it is thus:

Take about one third part of the smallest of any coal, (pit, sea, or charcoal) and commixing it very well with loam, (whereof there is in some places to be found a sort somewhat more combustible) make it up into balls (moistened with a little urine of man or beast) as big as an ordinary goose-egg, or somewhat bigger; or, if you will, in any other form, like brick-bats, &c. Expose these in the air till they are thoroughly dry; they

* In many places (where fuel is scarce) poor people spread Fern and Straw in the ways and paths where cattle dung and tread, and then clap it against a wall till it be dry; but that of hogs is very noisome.

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will be built into the most orderly fires you can imagine, burn very clear, give a wonderful heat, and continue a very long time. But first you must make the fire of charcoal, or small-coal, covering it with your eggs, hot-shots, or hovilles, as they are called, and building them up in pyramids, or what shape you please, they will continue a glowing, solemn, and constant fire for seven or eight hours, without being stirred; then encourage and recruit the innermost with a few fresh eggs, and turn the rest, which are not yet quite reduced to cinders. This mixture is devised to slacken the impetuous devouring of the fire, and to keep the coals from consuming too fast.

Two or three short billets, covered with charcoal, last much longer, and with more life, than twice the quantity by itself, whether charcoal alone or billet; and the billets under the charcoal being undisturbed, will melt as it were into charcoals of such a lasting size.

If small-coals be spread over the charcoal, where you burn it alone, it will bind it to longer continuance; and yet more, if the small-coal be made of the roots of Thorns, Briars, and Brambles. Consult Lord Bacon, Exp. 775.

The *Quercus Marina* (wrack or sea-weed) which comes in our oyster-barrels, laid under Newcastle coal to kindle it (as the use is in some places) will, as I am informed, make it out-last two great fires of simple coals, and maintain a glowing luculent heat without waste. This sort of fuel is much made use of in Malta and the Islands thereabout, especially to burn in their ovens; and the Peasant who first brought it into custom, I find highly commended by an Author, as a great Benefactor to his country. The manner of gathering it, is to cut it in summer-time from the rocks, whereon it grows abundantly, and bringing it in boats or otherwise to land, spread and dry it in the sun like hay, turning and cocking it till it be fully cured. It makes an excellent fire alone, and roasts to admiration; and when all is burnt, the ashes make one of the best manures for land in the world for the time they continue in virtue. This fuel adds much life, continuance, and aid to our fallen sea-coal; and if the main ocean should afford fuel, (as the Barnacles and Soland-geese are said to do in some parts of Scotland with the very sticks of their nests) we in these Isles may thank ourselves if we be not warm. These few particulars I but mention to animate improvements, and encourage ingenious attempts to detect more

cheap and useful processes for ways of charring coals, peat, and the like-fuliginous materials, as the accomplished Mr. Boyle has intimated to us in the fifth of those his precious Essays concerning the usefulness of Natural Philosophy, part ii. chap. vii. to which I refer the curious. In the mean time, were not He worthy a statue of gold, that (salvo to our Newcastle trade and seminary of mariners) should in this penury of fire-wood about so monstrous a devourer as this vast city, (poisoned with smoak and soot) find out an expedient that should, within the space of five and twenty years, free it from all this hellish and pernicious fog, by furnishing it with fuel sufficient to feed and maintain all its hearths and fires with sweet and wholesome billet? This the ingenious Mr. Nourse seems to demonstrate, and I think not impossible, whilst my *Fumifugium* * is long since vanished in *Aura*. There is no very great store of wood about Madrid, where the winters are sharp, and so very piercing, that there is spent no less than four millions of arrobas of charcoal, (every arroba being three quarters of our bushel, and pays to the King a Real before it comes into the town, or is sold): It is charred of the Enzina, or Cork tree: besides which they use very little fuel-wood, it being exceeding hard, and consequently lasting and sweet.—But to return to the law.

By the preamble of the statute of 7 Edward VI. one may perceive (the measures compared) how plentiful fuel was in the time of Edward IV. to what it was in the reigns of his successors: This suggested a review of sizes, and a reformation of abuses; in which it was enacted, that every sack of coals should contain four bushels; every Talehide to be four feet long, besides the carf; and if named of one, marked one, to contain sixteen inches circumference, within a foot of the middle; if of two marks, twenty-three inches; of three, twenty-eight; of four, thirty-five; of five, thirty-eight inches about, and so proportionably.

Billets were to be of three feet and four inches in length: The single to be seventeen inches and an half about; and every billet of one cast (as they term the mark) to be ten inches about; of two cast, fourteen inches, and to be marked (unless for the private use of the owner) within six inches of the middle; of one cast, within four inches of the end, &c.

NOTES.

* Mr. Evelyn wrote a Treatise in 1661, entitled *Fumifugium*, recommending a method to prevent the ill effects of smoak in the city of London.

Book III. Every bound faggot should be three feet long; the band twenty-four inches circumference, besides the knot.

In the 43d Eliz. the same statute (which before only concerned London and its suburbs) was made more universal, and that of Edw. VI. explained with this addition: For such Taleshides as were of necessity to be made of cleft-wood, if of one mark, and half round, to be nineteen inches about; if quarter-cleft, eighteen inches and an half: Marked two, being round, it shall be twenty-three inches compass; half-round, twenty-seven; quarter-cleft, twenty-six: Marked three, round, twenty-eight; half-round, thirty-three; quarter-cleft, thirty-two: Marked four, being round, thirty-three inches about; half-round, thirty-nine; quarter-cleft, thirty-eight: Marked five, round, thirty-eight inches about; half-round, forty-four; quarter-cleft, forty-three. The measure to be taken within half a foot of the middle of the length mentioned in the former statute.

Then for the billet, every one named a single, being round, to have seven inches and an half circumference; but no single to be made of cleft-wood: If marked one, and round, to contain eleven inches compass; if half-round, thirteen; quarter-cleft, twelve and an half.

If marked two, being round, to contain sixteen inches; half-round, nineteen; quarter-cleft, eighteen and an half; the length as in the statute of Kind Edward VI.

Faggots to be every stick of three feet in length, excepting only one stick of one foot long, to harden and wedge the binding of it; this to prevent the abuse, too much practised, of filling the middle part and ends with trash and short sticks, which had been omitted in the former statute: Concerning this and the dimensions of wood in the stack, see coppices, chap. i. book iii. to direct the less-instructed purchaser: And I have been the more particular upon this occasion, because nothing is more deceitful than our fuel brought in billet by the notch, as they call it in London; for by the vile iniquity of some wretches marking the billets as they come to the wharf, Gentlemen are egregiously cheated. I could produce an instance of a friend of mine, and a Member of this Society, of which the wood-monger has little cause to brag, since he never durst come at him, or challenge his money for the commodity he brought, because he durst not stand to the measure.

At Hall, near Foy, there is a faggot which consists but of one piece of wood, naturally grown in that form, with a band wrapped about it, and parted at the ends into four sticks, one of which is subdivided into two others: It was carefully preserved many years by an Earl of Devonshire, and looked on as portending the fate of his estate, which is since indeed come into the hands of four Cornish Gentlemen, one of whose estates is likewise divided betwixt two heirs. This we have out of Cambden; and I here note for the extravagancy of the thing, tho', as to the verity of such portents from trees, &c. I do not find upon enquiry (which I have diligently made of my Lord Brereton) that there is any certainty of the rising of those logs in the lake belonging to that noble person, so as still to premonish the death of the heir of that family, how confidently soever reported; though sometimes it has happened, but the event is not constant. To this class may be referred what is affirmed concerning the fatal prediction of Oaks bearing strange leaves, which may be enquired of; and of accidents fasciating the boughs and branches of trees, as noticed by Dr. Plott in Willows and other soft woods, especially in an Ash at Biffeter uniformly wreathed two or three times round: Such a curiosity also hangs up in the Portico of the Physic-Garden at Oxford, in a top branch of Holly, which shews it likewise happening sometimes even to harder woods; and it is probable that such as we sometimes find so *belicably* twisted, have received some blast that has contracted the fibres, and curled them in that extravagant manner. Wonderful contorsion and perplexity of the parts of trees may be seen and admired in Tea roots, especially in that given to the Royal Society by the Right Hon. the Lord Somers, (the late most learned president) and now amongst the natural rarities of the repository.

But I will now describe to you the mystery of Charring, (whereof something was but touched in the process of extracting tar out of the Pines) as I received it from a most industrious person, and so conclude the chapter.

Of charcoal there is usually made three sorts, viz. one for the Iron-works, a second for Gunpowder, and a third for London and Court, besides small-coals, of which we shall also speak in due place.

We will begin with that sort which is used for the Iron-works, because the rest are made much after the same manner, and with very little difference.

Book III. The best wood for this is good Oak, cut into lengths of three feet, as they size it for the stack: This is better than the cord-wood, though of a large measure, and much used in Essex.

The wood being cut, and set in stacks ready for the coaling, choose out some level place in the coppice, the most free from stubs, &c. to make the hearth on: In the midst of this area drive down a stake for your centre, and with a pole, having a ring fastened to one of the extreames, (or else with a cord put over the centre) describe a circumference from twenty or more feet semidiameter, according to the quantity of your wood designed for coaling, which being near, may conveniently be charred on that hearth; and which at one time may be twelve, sixteen, twenty, twenty-four, even to thirty stacks: If twelve therefore be the quantity you will coal, a circle, whose diameter is twenty-four feet, will suffice for the hearth; if twenty stacks, a diameter of thirty-two feet; if thirty, forty feet, and so proportionably.

Having thus marked out the ground with mattocks, hoes, and fit instruments, bare it of the turf, and of all other combustible stuff whatsoever, which you are to rake up towards the periphery, or outside of the circumference, for an use to be afterwards made of it, planeing and levelling the ground within the circle: This done, the wood is to be brought from the nearest part where it is stacked, in wheel-barrows; and first the smallest of it placed at the utmost limit, or very margin of the hearth, where it is to be set long-ways, as it lay in the stack; the biggest of the wood pitch, or set up on end round about against the small wood, and all this within the circle, till you come within five or six feet of the centre, at which distance you shall begin to set the wood in a triangular form till it come to be three feet high: Against this again, place your greater wood almost perpendicular, reducing it from the triangular to a circular form, till, being come within a yard of the centre, you may pile the wood long-ways, as it lay in the stack, being careful that the ends of the wood do not touch the pole, which must now be erected in the centre, nine feet in height, that so there may remain a round hole, which is to be formed in working up the stack-wood for a tunnel, and the more commodious firing of the pit, as they call it, though not very properly. This provided for, go on to pile, and set your wood upright to the other as before, till, having gained a yard more, you lay it long-ways again, as was shewed: And thus continue the work, still interchanging the po-

tion of the wood till the whole area of the hearth and circle be filled and piled up at the least eight feet high, and so drawn in by degrees in piling, that it resemble the form of a copped household loaf, filling all inequalities with the smaller truncheons till it lie very close, and be perfectly and evenly shaped. This done, take straw, haume, or fern, and lay it on the outside of the bottom of the heap, or wood, to keep the next cover from falling amongst the sticks; upon this put the turf, and cast on the dust and rubbish which was grubbed and raked up at the making of the hearth, and reserved near the circle of it; with this cover the whole heap of wood to the very top of the pit or tunnel to a reasonable and competent thickness, beaten close and even, that so the fire may not vent but in the places where you intend it; and if, in preparing the hearth, at first there did not rise sufficient turf and rubbish for this work, supply it from some convenient place near to your heap. There be who cover this again with a sandy or finer mould, which, if it close well, need not be above an inch or two thick. This done, provide a screen by making light hurdles with slit rods and straw of a competent thickness to keep off the wind, and broad and high enough to defend an opposite side to the very top of your pit, being eight or nine feet, and so as to be easily removed, as need shall require, for the *luing* of your pit.

When now all is in this posture, and the wood well ranged and closed, as has been directed, set fire to your heap; but first you must provide you a ladder to ascend the top of your pit; this they usually make of a curved tiller, fit to apply to the convex shape of the heap, and cut it full of notches for the more commodious setting their feet whilst they govern the fire above; therefore now they pull up and take away the stake which was erected in the centre to guide the building of the pile and cavity of the tunnel: This done, put in a quantity of charcoals, (about a peck) and let them fall to the bottom of the hearth; upon them cast in coals that are fully kindled; and when those which were first put in are beginning to sink, throw in more fuel, and so, from time to time, till the coals have universally taken fire up to the top; then cut an ample and reasonable thick turf, and clap it over the hole, or mouth of the tunnel, stopping it as close as may be with some of the former dust and rubbish. Lastly, with the handles of your rakes, or the like, you must make vent-holes, or registers, (as our chemists name them) through the stuff which covers your heap to the very wood, these in ran-

BOOK III.

gers of two or three feet distance, quite round within a foot (or thereabout) of the top, though some begin them at the bottom: A day after, begin another row of holes a foot and a half beneath the former, and so more, till they arrive to the ground, as occasion requires. Note, That, as the pit does coal and sink towards the centre, it is continually to be fed with short and fitting wood, that no part remain unfired; and if it chars faster at one part than at another, there close up the vent-holes, and open them where need is. A pit will in this manner be burning off and charring five or six days; and as it coals, the smoke, from thick and gross clouds, will grow more blue and livid, and the whole mass sink accordingly, so as by these indications you may the better know how to stop and govern your spiracles. Two or three days it will only require for cooling, which, the vents being stopped, they assist by taking now off the outward covering with a rabil or rubber; but this not far above the space of one yard breadth at a time; and first they remove the coarsest and grossest of it, throwing the finer over the heap again, that so it may neither cool too hastily, nor endanger the burning and reducing all to ashes, should the whole pit be uncovered and exposed to the air at once; therefore they open it thus round by degrees.

When now, by all the former symptoms, you judge it fully charred, you may begin to draw; that is, to take out the coals, first round the bottom, by which means the coals, rubbish, and dust sinking and falling in together, may choak and extinguish the fire.

Your coals sufficiently cooled, with a very long-toothed rake and a Vane you may load them into the coal-wains, which are made close with boards purposely to carry them to market. Of these coals the grosser sort are commonly reserved for the forges and iron-works, the middling and smoother put up in sacks, and carried by the colliers to London and the adjacent towns: Those which are charred of the roots, if picked out, are accounted best for chemical fires, and where a lasting and extraordinary blast is required.

Coal for the powder mills is made of Alder wood (but Lime tree were much better, had we it in that plenty which we easily might) cut, stacked, and set on the hearth like the former; but first the wood ought to be wholly disbarked, which work is to be done about Midsummer before, and being thoroughly dry, it may be coaled in the same method, the heap

or pile only somewhat smaller, by reason that they seldom coal above five or six stacks at a time, laying it but two lengths of the wood one above the other, in form somewhat flatter on the top than what we have described; likewise do they fling all their rubbish and dust on the top, and begin not to cover at the bottom, as in the former example. In like sort, when they have drawn up the fire in the tunnel, and stopped it, they begin to draw down their dust by degrees round the heap, and this proportionably as it fires, till they come about to the bottom; all which is dispatched in the space of two days. One of these heaps will char three-score sacks of coal, which may all be carried at one time in a waggon; and some make the court-coals after the same manner.

Lastly, Small coals are made of the spray and brush-wood, which is stripped off from the branches of copse-wood, and which is sometimes bound up into bavins for this use, though also it be as frequently charred without binding, and then they call it *cooming* it together. This they place in some near floor, made level and freed of incumbrances, where, setting one of the bavins or part of the spray on fire, two men stand ready to throw on bavin upon bavin, as fast as they can take fire, which makes a very great and sudden blaze, till they have burnt all that lies near the place, to the number (it may be) of five or six hundred bavins: But before they begin to set fire, they fill great tubs or vessels with water, which stand ready by them, and this they dash on with a great dish or scoup so soon as ever they have thrown on all their bavins, continually plying the great heap of glowing coals, which gives a sudden stop to the fury of the fire, whilst with a great rake they lay and spread it abroad, and ply their casting of water still on the coals, which are now perpetually turned by two men with great shovels, a third throwing on the water. This they continue till no more fire appears, though they cease not from being very hot; after this they shovel them up into great heaps, and, when they are thoroughly cold, put them up in sacks for London, where they use them amongst divers artificers, both to kindle greater fires, and to temper and anneal their several works. Lastly, this is to be observed, that the wood which yields the finest coal is more flexible and gentle than that which yields the contrary.

The best season for the fetching home of other fuel is in June, the ways being then most dry and passable; yet I know some good husbands will begin rather in May, because fallowing and stirring of ground for

BOOK III. corn comes in the ensuing months, and the days are long enough; and swains have then least to do.

And thus we have seen how for House-boot, and Ship-boot, Plow-boot, Hey-boot, and Fire-boot, the Planting and Propagation of Timber and Forest-trees is requisite; so as it was not for nothing that the very name (which the Greeks generally applied to timber) *ῥαη*, by synecdoche, was taken always *pro materia*; since we hardly find any thing in nature more universally useful; or, in comparison with it, deserving the name of Material; it being, in truth, the mother-parent and (metaphorically) the passive principle ready for the form.

To complete this chapter of the universal use of trees, and the parts of them, something I could be tempted to say concerning staves, wands, &c. their antiquity, use, divine, domestick, civil, and political; the time of cutting, manner of seasoning, forming, and other curious particulars, (how dry soever the subject may appear) both of delight and profit; but we reserve it for some more fit opportunity, and perhaps it may merit a peculiar treatise, as acceptable as it will prove amusing.

We have already spoken of that modern art of *Tapping* trees in the spring, by which, doubtless, some excellent and specifick medicines may be attained, as (before) from the Birch, for the stone; from Elms and Elder, against fevers; so from the Vine, the Oak, and even the very Bramble, besides the wholesome and pleasant drinks, spirits, &c. that may possibly be educed out of them—This we leave to the industrious, satisfying ourselves that we have been among the first who have hinted and published the ways of performing it.

Let us now sum up all the good qualities, and transcendent perfections of trees, in the harmonious Poets Confort of Elogies:

————— dant utile lignum
 Navigiis Pinos, domibus Cedrosque Cupressosque;
 Hinc radios trivere rotis, hinc tympana plaustris
 Agricolaë, & pandas ratibus posuere carinas.
 Viminibus Salices fecundæ, frondibus Ulmi:
 At Myrtus validis hastilibus, & bona bello
 Cornus: Itryæos Taxi torquentur in arcus.

Nec Tiliæ læves, aut torno rasile Buxum,
 Non formam accipiunt ferroque cavantur acuto:
 Nec non & torrentem undam levis innatat Alnus—
 Missa Pado; nec non & apes examina condunt
 Corticibusque cavis, vitiosæque Ilicis alveo.

GEORG. ii.

— Pines are for masts an useful wood,
 Cedar and Cypress, to build houses good:
 Hence covers for their carts, and spokes for wheels
 Swains make, and ships do form their crooked keels:
 With twigs the Sallows, Elms with leaves are freight;
 Myrtles stout spears, and Cornel good for fight:
 The Yews into Ityrcan bows are bent;
 Smooth Limes and Box, the Turner's instrument
 Shaves into form, and hollow cups does trim;
 And down the rapid Po light Alders swim:
 In hollow bark bees do their honey stive,
 And make the trunk of an old Oak their hive.

The most ingenious Ovid introduces the miraculous groves raised by the melodious song of Orpheus:

— Non Chæonis abfuit arbor,
 Non nemus Heliadum, non frondibus Æsculus altis,
 Nec Tiliæ molles, nec Fagus, & innuba Laurus,
 Et Coryli fragiles, & fraxinus utilis hastis,
 Enodisque Abies, curvataque glandibus Ilex,
 Et Platanus genialis, Acerque coloribus impar,
 Amnicolæque simul Salices, & aquatica Lotos,
 Perpetuoque virens Buxus, tenuisque Myricæ,
 Et bicolor Myrtus, & baccis cærulea Tinus:
 Vos quoque flexi-pedes Hederæ venistis, & una
 Pampineæ vites, & amictæ Vitibus Ulmi:
 Ornique, & Piceæ, Pomoque onerata rubenti
 Arbutus, & lentæ victoris præmia Palmæ:
 Et succincta comas, hirsutaque vertice Pinus
 Grata Deum matri, &c.

MET. x.

Book III.

——— nor trees of Chaony,
 The Poplar, various Oaks that pierce the sky,
 Soft Linden, smooth-rind Beech, unmarried Bays,
 The brittle Hafel, Ash, whose spears we praise,
 Unknotty Fir, the solace-shading Planes,
 Rough Chefnuts, Maple fleck'd with different grains,
 Stream-bordering Willow, Lotus loving lakes,
 Tough Box, whom never sappy spring forsakes,
 The slender Tamarisk, with trees that bear
 A purple Fig, nor Myrtles absent were.
 The wanton Ivy wreath'd in amorous twines,
 Vines bearing Grapes, and Elms supporting Vines,
 Straight Service trees, trees dropping pitch, fruit-red
 Arbutus, these the rest accompanied.
 With limber Palms, of victory the prize,
 And upright Pine, whose leaves like bristles rise,
 Priz'd by the Mother of the Gods ——— SANDYS.

This incomparable Poet is imitated by our divine Spencer, where he brings his gentle Knight into a shady grove, praising

——— the trees so straight and high,
 The failing Pine, the Cedar proud and tall,
 The Vine-prop Elm, the Poplar never dry,
 The builder Oak, sole King of Forests all,
 The Aspine, good for staves; the Cypress funeral.
 The Laurel, meed of mighty conquerors
 And Poets sage: The Fir that weepeth still,
 The Willow, worne of forlorne paramours,
 The Eugh, obedient to the bender's will,
 The Birch for shafts, the Sallow for the mill,
 The Myrrh, sweet bleeding in the bitter wound,
 The war-like Beech, the Ash for nothing ill,
 The fruitful Olive, and the Platane round,
 The carver Holm, the Maple seldom inward found. CANTO I.

And in this symphony might the noble Tasso bear likewise his part, but that these are sufficient, *Et tria sunt omnia.*

What now remains, concerns only some general precepts, and directions applicable to most of that we have formerly touched; together with a brief of what farther laws have been enacted for the improvement and preservation of woods; and which having dispatched, we shall with a short Parænesis, touching the present ordering and disposing of the Royal Plantations for the future benefit of the Nation, put an end to this ruttick Discourse.

CHAP. IV.

CHAP. V.

APHORISMS, or certain General Precepts, of Use to the foregoing Chapters.

BOOK III. **T**RY all sorts of seeds, and by their thriving you shall best discern what are the most proper kinds for grounds,

Quippe solo natura subest—

and of these design the main of your plantation. Try all soils, and fit the species to their natures. Beech, Hazel, and Holly affect gravel and gritty; and if mixed with loam, Oak, Ash, and Elm. In stiff ground, the Ash and Hornbeam; and in light feeding ground or loam, any sort whatsoever: In the lower and wetter lands, the Aquatics. *

Keep your newly-sown seeds continually fresh, and in the shade (as much as may be) till they peep.

NOTES.

* Of plants, each species affects a particular soil in preference to every other. In their culture, therefore, it is of the utmost importance to have a distinct knowledge of the *Loca Natalia*, that the nature of the soil in which they are cultivated may be made to approach, as near as possible, to that in which they spontaneously grow. This is the solid and proper foundation of Planting and Gardening:

Nec vero terre férre omnes omnia possunt.

Fluminibus Salices, crassisque paludibus Alni

Nascuntur, steriles saxosis montibus Orni,

Litora Myrteis lætissima: denique apertos

Bacchus amat colles, Aquilonem et frigora Taxi. GEORG. ii.

The numerous species of plants which grow betwixt the North Pole and the Equator, when viewed in detail, appear to differ from each other only by insensible degrees; yet are the plants of the frozen zones, when viewed in cumulo, or in a body, totally different from those which are produced betwixt the tropics. Thus we often see whole families of plants natives of the torrid zone, which are never to be found in any of the others.—In the climate of plants, says Linneus, are to be considered latitude, longitude, and the temperature or elevation of the soil. Vaillant was among the first who viewed the *Loca Natalia* of plants in this light; but his observations were confined to latitude alone.—Places situated under the same parallel of latitude, but in opposite hemispheres, produce plants that are totally different; even those in the same hemisphere are rarely alike. Thus Rome, Pekin, and New-York in America, are situated almost in the same degree of north latitude, yet produce very different plants. The

All curious seeds and plants are diligently to be weeded, till they are strong enough to over-drop or suppress them; and you shall carefully hoe, half-dig, and stir up the earth about their roots during the first three years, especially in the vernal and autumnal equinoxes: This work should be done in a moist season for the first year, to prevent the dust, and the suffocating of the tender buds; but afterwards in the dry weather.

Plants raised from seed should be thinned where they come up too thick; and none so fit as those you thus draw to be transplanted into hedge-rows, especially where ground is precious.

Suckers that sprout from the farthest part of the stem, or body of the mother-tree, are best, as easier plucked up without detriment to the roots and fibres, or violence to the mother: It were good therefore first to uncover the roots whence they spring, and to cut them close off, replanting them immediately: those which grow at more distance may be separated with some of the old root, if you find the sucker not well furnished.

NOTES.

same may be said of the plants of Florida and Palestine, the Cape of Good-Hope, and Chili in South-America, places which exactly correspond in latitude; the two former situated in the northern hemisphere; the latter in the southern.—What has been affirmed of latitude, may likewise be asserted of places that are situated upon the same meridian. Thus the North-Cape, Rome, Upsal, and the Cape of Good-Hope, agree in longitude, yet produce plants that are totally different.—The aptitude or disposition of plants to grow in certain climates, and not in others, seems to depend not so much upon longitude and latitude, as upon the elevation of the soil, or difference of temperature in such climates. From this cause proceeds the difference which is generally found to obtain betwixt the plants of the torrid, and those of the temperate and frigid zones. For when in the torrid zone we find the mountains, which, by their elevation, have acquired a temperature similar to that of the temperate or frigid zones, we always discover on such mountains the same, or, at least, a part of the same plants. Thus the plants on the mountains of Lapland, of Switzerland, Greenland, Siberia, Wales, the Pyreneans, Olympus, Ararat, and Brasil, though placed at such immense distances from each other, are nearly the same.—As at a certain depth, the temperature of water is found to be nearly the same in all climates, so the greatest part of Aquatic plants are common to the torrid, temperate, and frigid zones. Thus the Water-lily, *Aldrovanda*, Sun-dew, Arrow-head, Water-milfoil, and many other Aquatics, are equally natives of Europe and the Indies.

BOOK III.

To produce suckers, lay the roots bare, and slit some of them here and there discreetly, and then cover them.

Layers are to be bent down and couched in rich mould; and if you find them stubborn, you may slit a little in the bark and wood, but no deeper than to make it ply, without wounding the tender heart. Putting forth root is assisted by pricking the bark, slitting or binding a packthread about the part you would have them spring from.

The proper season is from the early spring or Mid-August, and in all dry seasons observe to keep them diligently watered.

Slips and cuttings (by which most trees may be propagated) taken in moist ground, from August to the end of April frequently moistened, should be separated at the burs, joints, or knobs, two or three inches beneath them: Strip them of their leaves before you bury them, leaving no side-branches, or little top. Some slit the end where it is cut off; at two years end is the soonest they will be fit to take up; layers much sooner.

In transplanting, omit not the placing of your trees towards their accustomed aspect; and if you have leisure, make the holes the autumn before; the wider the better: Three feet over and two deep is little enough if the ground be any thing stiff, often stirring and turning the mould, and mixing it with better as you may find cause. This done, dig or plough about them, and that as near their stems as you can come without hurting them, and therefore rather use the spade for the first two or three years; and preserve what you plant steady from the winds and annoyance of cattle, &c.

Remove the softest wood to the moistest grounds.

Divise arboribus patriæ——

GEORG. II.

Begin to transplant Forest-trees when the leaves fall after Michaelmas; you may adventure when they are tarnished and grow yellow; it is lost time to commence later, and, for the most part of your trees, early Transplanters seldom repent; for sometimes a tedious bind of frost prevents the whole season, and the baldness of the tree is a note of deceit; for some Oaks, Hornbeam, and most Beeches preserve their dead leaves till new ones push them off.

Set deeper in the lighter grounds than in the strong, but shallowest in clay: Five inches is sufficient for the driest, and one or two for the moist, provided you establish them against winds.

Plant forth in warm and moist seasons, the air tranquil and serene, the wind westerly; but never whiles it actually freezes, rains, or in misty weather, for it moulds and infects the roots.

What you gather and draw out of woods, plant immediately, for their roots are very apt to be mortified, or hardened and withered by the winds and cold air.

Trees produced from seeds must have the tap-roots abated, (the Walnut tree and some others excepted, and yet if planted merely for fruit, some affirm it may be adventured on with success) and the bruised parts cut away, but sparing the fibrous, for they are the principal feeders; and those who cleanse them too much are punished for the mistake.

In spring, rub off some of the collateral buds to check the exuberancy of sap in the branches, till the roots be well established.

Transplant no more than you well fence, for that neglected, tree-culture comes to nothing; therefore all young-set trees should be defended from the winds and sun, especially the east and north, till their roots are fixed, that is, till you perceive them shoot; and the not exactly observing of this article, is the cause of the perishing of the most tender plantations; for it is the invasion of these two assailants which does more mischief to our new-set and less hardy trees, than the most severe and durable frosts of a whole winter. And here let me add this caution again, that, in planting of trees of stature for avenues or shades, you set them at such distance as that they be not in reach of the mansion-house, in case of being blown down by the winds, for reasons sufficiently obvious. See Hist. of the Storm, Nov. 26, 1703.

The properest soil, and most natural, apply to distinct species: *Nec vero terræ ferre omnes omnia possunt*. Yet we find by experience that most of our forest-trees grow well enough in the coarsest lands, provided there be a competent depth of mould; for albeit most of our wild plants covet to

BOOK III. run just under the surface, yet, where there is not sufficient depth to cool them, and entertain the moisture and influences, they are neither lasting nor prosperous.

Wood well planted will grow in moorish, boggy, heathy, and the stoniest grounds; only the white and blue clay, which is commonly the best pasture, is the worst for wood; and such good timber as we find in any of these, Oaks excepted, is of an excessive age, requiring thrice the time to arrive at their stature.

If the season require it, all new plantations are to be plied with waterings, which is better poured into a circle at some distance from the roots, which should continually be bared of grass; and if the water be rich, or impregnated, the shoots will soon discover it; for the liquor, being percolated through a quantity of earth, will carry the nitrous virtue of the soil with it: By no means therefore water at the stem, because it washes the mould from the roots, comes too crude, and endangers their rotting.

But, for the cooling and refreshing tree roots, the congealing of rotten litter, sprinkled over with fine earth, is good; or place potshards, flints, or pebbles near the foot of the stem; for so the Poet:

Aut lapidem bibulum, aut squallentes infode conchas:
Inter enim labentur aquæ, tenuisque subibit
Halitus. —————

GEORG. ii.

Lime-stones, or squalid shells, that may the rain,
Vapours, and gliding moisture entertain.

But remember you remove them after a competent time, else the vermin, snails, and insects, which they produce and shelter, will gnaw and greatly injure the bark; and therefore, to lay a coat of moist rotten litter with a little earth upon it, will preserve it moist in summer and warm in winter, enriching the showers and dews that strain through it.

Young plants will be strangled with corn, oats, pease, or hemp, or any rankly growing grain, if a competent circle and distance be not left, as of near a yard or so of the stem. This is a useful remark; but whether the setting or sowing of beans near trees make them thrive the more,

(as Theophrastus writes, I suppose he means fruit-trees) I leave to experience.

Cut no trees (especially having an eminent pith in them, being young and tender too) when either heat or cold are in extreams, nor in very wet and snowy weather; and in this work it is profitable to discharge all trees of unthriving, broken, wind-shaken browse, and such as our law terms *Cablicia*, and to take them off to the quick,

—Ne pars sincera trahatur.

And for Evergreens, especially such as are tender, prune them not after planting till they do radicate, that is, by some little fresh shoot discover that they have taken root.

Cut not off the top of the leading twig or shoot (unless very crooked, and then at the next erect bud) when you transplant timber-trees, but those of the collateral you may shorten, stripping up the rest close to the stem; and such as you do spare, let them not be the most opposite, but rather one above another, to preserve the part from swelling and hindering its taper growth: Be careful also to keep your trees from being top-heavy, by shortening the side-branches competently near the stem. Young plants, nipt either by the frost or teeth of cattle, do commonly break on the sides, which impedes both growth and spiring: In this case, prune off some, and quicken the leading shoot with your knife at some distance beneath its infirmity; but if it be in a very unlikely condition at spring, cut off all close to the very ground and hope for a new shoot, continually suppressing whatever else may accompany it, by cutting them away in summer.

Walnut, Ash, and pithy trees are safer pruned in summer and warm weather than in the spring, whatever the vulgar fancy.

I will conclude with the technical names, or dissimilar parts of trees, as I find them enumerated by the industrious and learned Dr. Merett: Scapus, Truncus, Cortex, Liber, Malicorium, Matrix, Medulla & Cor, Pecten, Circuli, Surculi, Rami, Sarmenta, Ramusculi, Spadix, Vimen, Virgultum & Cremium, Vitilia, Talea, Scobs, Termes, Turiones, Fron-des, Cachrys & Nucamentum, Julius & Catulus, Comæ: The species; Frutex, Suffrutex, &c. to which add Alburnum, Capitulum, Cima,

Book III.

Echinus, Geniculum, Pericarpium, Petiolus, &c. All which I leave to be put into good and proper English (as our learned Phytologist Mr. Ray has done) by those who shall once oblige our nation with a full and absolutely compleat dictionary, as yet a desiderate amongst us; However of late infinitely improved. *

To this I shall add the time and season of the flourishing of trees, computing from the entry of each month as the figures denote; that is, from March (where the Doctor begins) inclusively. March, Acer 3. (i.) from March to May, viz. one month; & sic de cæteris) Populus 2. Quercus 5. Sorbus 2. Ulmus 2. April, Alnus 2. Betula 2. Castanea 4. Euonymus 2. Fagus 2. Fraxinus 2. Nux Juglans 3. Salix 2. Sambucus 2. May, Cornus 2. Genista 4. Juniperus, Morus 2. Tilia 4. June, Aquifolium 2. July, Arbutus 2. February, Buxus 2, &c.

Many more useful observations may be collected and added to these, from the diligent experience of planters. †

NOTES.

* In the year 1764, Dr. Berkenhout published his *Clavis Anglica Linguae Botanicae*; and in 1770, Mr. C. Milne favoured the Botanical Student with a Botanical Dictionary, but upon a more enlarged plan than the former.

† The celebrated Linnæus has given us a complete catalogue of the trees in Sweden, with respect to the times of their *budding*, *leafing*, and *flowering*: and the ingenious Mr. Stillingfleet, in his Tracts, has favoured us with observations of the same nature upon trees and shrubs growing in England.

CHAP. VI.

*Of the Laws and Statutes for the Preservation and Improvement of
WOODS and FORESTS.*

IT is not to be passed by, that the very first law we find which was ever promulged, was concerning Trees—and that laws themselves were first written upon them *, or tables composed of them; and after that establishment in Paradise, the next we meet withal are as ancient as Moses. You may find the statute at large in Deut. xx. 19, 20. which tho' they chiefly tended to fruit-trees, even in an enemy's country, yet you will find a case of necessity only alledged for the permission to destroy any other.

CHAP. VI.

* The laws of Numa were first cut in Quern's Tabulis, before they were engraven in brass. See Dionysius Halicarnass. l. iii.

To sum up briefly the laws and civil constitutions of great antiquity, Cervius informs us it was no less than capital, *alienas arbores incidere*; the *Lex Aquilia*, and those of the twelve tables mentioned by Paulus, Cujas, Julianus, and others of that robe, repeated divers more.

It was by those sacred constitutions provided, that none might so much as plant trees on the confines of his neighbour's ground, but he was to leave a space of at the least five feet, for the smallest tree, that they might not injure him with their shadow. *Si arbor in vicini agrum impenderit, cam subluato, &c.* and if, for all this, any hung over farther, it was to be stripped up fifteen feet: And this law Balduinus, Olderdorpius, and Hoto-man recite out of Ulpian, lib. i. F. de Arb. Cædend. where we have the Prætor's interdict expressed, and the impendent wood adjudged to appertain to him whose field or fence was thereby damaged: Nay, the wise Solon prescribed ordinances for the very distances of trees, as the divine Plato did against stealing of fruit, and violating of plantations: And the Interdiction de *Glande legenda* runs thus in Ulpian, *AI PRÆTOR, GLANDEM, QUÆ EX ILLIUS AGRO IN TUUM CADIT, QUO MINUS ILLI TERTIO QUOQUE DIE LEGERE AUFERRE LICEAT, VIM FIERI VETO.* And yet, tho' by the Prætor's permission he might come every third day to gather it up without trespass, his neighbour was to share of the mast which so fell into his ground; and this chapter is well supplied by Pliny, lib. xvi. cap. v. and Cujas, upon the place, interprets *Glandem* to signify not the Acorns of the Oak alone, but all sorts of fruit whatso-

BOOK III. ever, lib. cxxxvi. *F. de Verb. Signif. L. Unis ff. de Glande leg.* as by usage of the Greeks, amongst whom *ἀνὰ δένδρα* imports all kinds of trees.

There were also laws concerning boundaries to be found at large in other learned authors, De Re Agraria, of which we give this short extract: Some admitting any sort of trees, others of peculiar kinds for the fencing of their grounds; others with foreign trees, that the difference of the wood might serve as a mark: Some by agreement planted them in common upon the very borders; some, at their private charge, a little within the margents of their own fields, &c. Amongst the different sorts of trees, we find Pines and Cypress trees placed for bounds, also Ash, Elm, or Poplar; which being near the limits, with any cultivated ground between, the intermediate spaces were filled with shrubs. In case the trees were in common, some preserved them untouched on both sides; others, the stems only, lop, tops, and branches (especially if they belonged to a particular person) to cut or spare at their pleasure, provided they planted others in their room. In trees marked, it must be considered whether they are in common, which ought to be marked in the middle, or on each side; and if one side of the tree have leaves, the other should be cut, to signify their belonging to those persons, on the border of whose grounds they are left entire: To this for trees of eight feet asunder. Those at twenty feet distance were marked with X or T, to notify a flexure or turning thereabout. Some permit them to stand till they arrive to such a bulk and stature as to over-top the rest, distinguished also from those marked on both sides, whether they stand in woods, barren or uncultivated land, as being supposed in common: The same rule holds if marked in the middle. If but one side be marked, the unmarked side is the boundary: If the mark be different on either side, (and none else to be seen) such trees are not to be accounted boundaries. If, as sometimes, briars and such shrubs grow on the antient limits, it must be considered of what kind they are, and should be enquired how it happens that they are often found in the middle of the fields. Lastly, in champaign and open places, foreign trees were usually planted. There are more of those nice rules to be found among the lawyers, whilst before any of these instances the images of *Satyrs* bounded the confines, and were counted as *Termini**, which none might remove, without

N O T E S.

* The *Hermæ*, or what the Latins call *Termini*, were placed for boundaries of lands. They were sometimes worshipped as gods, but the sacrifices offered to them

being accounted as sacrilegious, and the person punished with death. CHAP. VI.
 These, and the *Hermæ*, were reputed protectors of such boundaries:

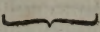
—————et te pater
 Silvane, tutor finium!

HOR.

In the mean time, no trees whatsoever might be planted near public aqueducts, lest the roots should insinuate into, and displace the stones; nor on the very margin of navigable rivers, lest the boats and other vessels, passing to and fro, should be hindered; therefore such impediments were called *retæ*, *quia naves retinent*, says the Gloss; and because the falling of the leaves corrupted the water: So nor within such a distance of highways, (which also our own laws prohibit) that they might dry the better, and less cumber the traveller. Trees that obstructed the foundation of houses were to be felled: Barthol. lib. i. doct. c. de Interdict. Ulp. in L. priore ff. de Arb. cædend. Trees spreading their roots in neighbour-ground to be in common: See Cujas and Paulus in L. Arb. ff. de Comuni dividend. where more of the *Alienation* of trees felled, and not standing but with the *Funds*, as also of the *Usu-fruit* of trees, and the difference betwixt *Arbores* Grandes, and *Cremiales* or *Cedux*; of all which

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were *unbloody*; and Plutarch gives the reason, “lest they should violate the tokens of peace and agreement by staining them with blood.” The *Termini* were originally square statues of Mercury, and generally without legs or arms. The Athenians placed them in the vestibules of their houses and temples, and it was esteemed highly criminal to remove or deface them.—One night (says Thucydides) the heads of all the *Hermæ* in the city were cut off: Strict search was made after the perpetrators of this crime, in order to bring them to punishment: Alcibiades was suspected, — and obliged to fly into banishment. Other heads, besides that of Mercury, were placed upon square pillars, and constituted *Termini*. When it was a head of Minerva, called in Greek *Athena*, it was named a *Hermathena*. Those which had Apollo’s head, were named *Hermapello*; and those *Hermeros* which had the head of Cupid, from his being named Eros. Such as had the heads of Hercules, Anubis, Osiris, or Harpocrates, were called *Hermheracles*, *Hermanubis*, *Hermosiris*, and *Hermharpocrates*. These names frequently occur in the Latin classics. Exclusive of worship, it was strict policy both in the Greeks and Romans to consider their *Termini* as sacred; and if we look into the books of the Old Testament we shall find that vengeance was denounced against such as removed them. “Curfed is he that removeth his neighbour’s land-mark.”

BOOK III.  Ulpiam, Baldus, Alciat, with the laws to govern the Conlucatores and Sublucatores, and Pruners: Vid. Pan. f. c. Sent. lib. v. Festus, &c. for we pass over what concerns Vines and Olive trees, to be found in Cato de R. R. &c. Nor is it here that we design to enlarge, as those who have philologized on this occasion, *de Sycophantis* and other curious criticisms; but to pass now on, and confine myself to the prudent sanctions of our own Parliaments; for though, according to the old and best spirit of true English, we ought to be more powerfully led by royal example, than to have need of more cogent and violent laws; yet, that our Discourse may be as ample, and as little defective as we can render it, something, it is fit, should be spoken concerning such laws and ordinances as have been from time to time constituted amongst us for the encouragement and direction of such as do *well*, and for the animadversion and punishment of those who continue *refractory*.

But, before we descend to our munipale, and present laws and constitutions, let us enquire what was antiently meant by a Forest, waving those (I think) impertinent etymologies, *quia foris est*, Lumbard Gloss, &c. A Forest is properly an harbour for wild beasts, *quasi ferarum statio*, for which mighty tracts and portions of land have been afforded (as the term is) by the Kings and Monarchs of this nation, beyond any other in Europe, and guarded with such strict, rigorous, and severe laws, as did not extend to the prohibition of killing and destruction of deer and venison alone, but even to that of killing little silly birds; and that not only to the forfeiture and loss of goods, but of limb and life. Such, amongst others, was that of Richard I. upon incurring the loss of the offender's eyes, testicles, &c. to the unsufferable hinderance of great improvements, whilst there might have been not only enough for royal diversion, but for the increase of timber and people, which are the true glory and safety of this nation. In the mean time, it is remarkable that William Rufus, (successor to the great Conqueror) chasing a stag under a spreading Oak, was, by the glance of an arrow levelled at the beast, deprived of his life. The Historian recounts it as God's visiting the sin of the father upon the children, for his demolishing so many churches and villages, and turning them into receptacles and dens of wild beasts; there having, besides this Prince, been two more who met with their death in New-Forest. There were in Yorkshire alone, in the time of Henry VIII. two hundred seventy and five woods, (besides the parks and chases) most of them containing five hundred acres: See Mr. Cambden's Britannia. As to what we call

wood-land, I know not how to distinguish forest from woods, unless for its being applicable to all sorts in common; for heretofore (which as Strabo tells us) the antient inhabitants of this island's security was their woods, instead of cities and towns, as still they are among the people of the uncultivated America: Nor doubtless was our superb and stately Metropolis (the antient Trinovant) any other; from whence some derive its name, turning Den only into Don; whilst, since our remembrance, the whole city was (till the late dreadful conflagration) a *wooden city*, almost entirely built of wood and timber.

Wood-land in Warwickshire (says the same learned Antiquary) was antiently called Ardena, importing the same in British, and still retaining the same in what is left of that vast forest the Ardenner-Wald in the Nether Germany, which stretching through the Caledonium of Luxemburg to the confines of Champagne, for more than an hundred miles in length, was no more than such as might compass a wood-land; from whence our own Danica Silva (the forest of Dean) might probably derive its name contracted, and Diana Nemorensis be found under the British Arduena and Arden: But dismissing these conjectures, we now come to the subject of this chapter, as it more immediately concerns our common law, and some of other nations, which we shall deduce in this order.

From the time of Edward IV. were enacted many excellent laws for the planting, securing, cutting, and ordering of woods, coppices, and underwoods, as then they took cognizance of them, together with the several penalties upon the infringers, especially from the 17 of Hen. VIII. 25, &c. confirmed by the 13 and 27 of Q. Eliz. cap. xxv, xix, &c. which are diligently to be consulted, revived, put in execution, and enlarged where any defect is apparent; as in particular the act of exempting timber of twenty-two years growth from tithe, for a longer period, to render it complete and more effectual to improvement; and that law repealed, by which Willows, Sallows, Oziers, &c. (which they term *Sub-bois*) are reputed but as weeds.

Severer punishments have lately been ordained against our wood-stealers, destroyers of young trees, &c. By an antient law of some nation, I read, he forfeited his hand who beheaded a tree without permission of the owner; and I cannot say they are sharp ones, when I compare the severity of our

BOOK III. laws against mare-stealers; nor am I by inclination the least cruel, but I do affirm, we might as well live without mares as without masts and ships, which are our wooden, but no less profitable horses.

And here we cannot but perstringe those riotous assemblies of idle people, who, under pretence of going a *Maying*, as they term it, do oftentimes cut down and carry away fine straight trees to set up before some alehouse, or revelling-place, where they keep their drunken Bacchanalia: For tho' this custom was introduced by the Emperor Anastasius to abolish the Gentile *Majuma* of the Romans at Ostia, which was to transfer a great Oaken tree out of some forest into the town, and erect it before their Mistresses door; yet I think it were better to be quite abolished amongst us, for many reasons, besides that of occasioning so much waste and spoil as we find is done to trees at that season, under this wanton pretence, by breaking, mangling, and tearing down of branches, and intire arms of trees, to adorn their wooden idol. The Imperial law against such disorders we have in L. ob. id. fl. ad legem Aquill. & in ff. l. xlvii. tit. vii. Arborum furtim cæsarum. See also Triphon. L. ig. de Bon. off. cont. tab. vel in ligna focaria. L. Ligni ff. de Lege 3, &c.

To these I might add the laws of our King Ina; or as the learned Lambard reckons them in his *Ἀρχαιογραφία* de priscis Anglorum legibus, whose title is, *Be þuþu bappete, Of Burning Trees*. The *Sanction* runs thus:

"If any one set fire of a felled wood, he shall be punished, and besides pay three pounds; and for those who clandestinely cut wood, (of which the very sound of the ax shall be sufficient conviction) for every tree he shall be mulcted thirty shillings. A tree so felled, under whose shadow thirty hogs can stand, the offender shall be mulcted three pounds, &c."

Severe laws against wood-stealers, v. Greenway de L. L. abrog. in Holland. ad Tit. Arbor. furt. Cæsar. lib. ii. One cruelly whipt for it. See also Carpzovius in Prax. Crim. Par. ii. Quest. 23. Num. 2. and several others to that purpose.

I have heard, that in the great expedition of 1588, it was expressly enjoined the Spanish Commanders of that signal Armada, that if, when landed, they should not be able to subdue our nation, and make good their conquest, they should yet be sure not to leave a tree standing in the Forest of Dean. It was like the policy of the Philistines, when the poor Israelites went down to their enemies *Smiths* to sharpen every man his tools; for, as they said, *lest the Hebrews make them swords or spears*; so these, *lest the English build them ships and men of war*. Whether this were so or not, certain it is, we cannot be too jealous for the preservation of our woods; and especially of those eminent, and, with care, inexhaustible magazines.

In the Duke of Luxemburg's country no farmer is permitted to fell a timber-tree without making it appear he hath planted another. And we have already mentioned that inviolable custom about Frankfort, where the young farmer must produce a certificate of his having set a number of Walnut trees, before he hath leave to marry. But of these, and the like, V. Follar in *Constit. Rey. de Offic. Tract.* 11, 92, 93, &c. I dare not suggest the encouragement of a yet farther restraint, that even *Proprietors* themselves should not presume to make havock of some of their own woods to feed their prodigality, and heap fuel to their vices; but it is worthy of our observation, that (in that inimitable Oration, the second Philippic) Cicero does not so sharply reproach his great Antagonist for any other of his extravagancies, which yet he there enumerates, as for his wasteful disposition of certain wood-lands belonging to the Commonwealth, amongst his jovial Bravos and lewd Companions; *tua ista detrimenta sunt* (meaning his debauches) *illa nostra*; speaking of the timber. And, doubtless, the spoil and wasting of this necessary material is no less than a publick calamity. This John Duke of Lancaster knew well enough, when, to revenge the depredations made upon the English borders, it is said, he set four-and-twenty thousand axes at work at once, to destroy the woods in Scotland.

But to the laws: It were to be wished that our tender and improvable woods should not admit of cattle by any means, till they were quite grown out of reach; the statutes which connive at it, in favour of custom, and for the satisfying of a few clamorous and rude *Commoners*, are too indulgent; since it is very evident, that less than a fourteen or fifteen years inclosure, is in most places too soon; and our most material trees would be of infinite more worth and improvement, were the standards suffered to grow to timber, and not so frequently cut, at the next felling of the wood, as the general custom is. In the 22d Edw. IV. the liberty arrived but to seven years after a felling of a forest or purlieu; and but three years before, without special licence. This was very narrow; but let us then look on England as an over-grown country.

Wood in parks was afterwards to be four years fenced, upon felling; and yearling colts and calves might be put into inclosed woods after two: By the 13th Eliz. five years, and no other cattle till six, if the growth was under fourteen years; or until eight, if exceeding that age till the last felling. All which statutes being by the act of Hen. VIII. but temporal, this parliament of Elizabeth thought fit to make perpetual.

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Then to prevent the destructive razing and converting of woods to pasture: No wood of two acres, and above two furlongs from the mansion-house, should be indulged: And the prohibitions are good against assarts made in forests, &c. without license: The penalties are indeed great, but how seldom inflicted? And what is now more easy than compounding for such a license?

In some parts of Germany where a single tree is observed to be extraordinary fertile, a constant and plentiful mast-bearer, there are laws to prohibit their felling it without special leave: And it was well enacted amongst us, that even the owners of woods within chases should not cut down the timber without view of officers; this act being in affirmance of the common law, and not to be violated without Prescription: See the case cited by my Lord Coke in his comment on Littleton. Tenure Burgage, lib. ii. sect. 170. Or if not within chases, yet where a common person had liberty of chase, &c. and this would be of much benefit, had the Regarders performed their duty, as it is at large described in the writ of the twelve articles; and that the surcharge of the forests had been honestly inspected with the due perambulations, and antient metes. Thus should the Justices of Eyre dispose of no wood without express commission, and in convenient places. *

Care is likewise by our laws to be taken that no unnecessary embezzlement be made by pretences of repair of paling, lodges, browse for deer, &c. wind-falls, root-falls, dead and fear trees, all which are subject to the

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* A justice in Eyre cannot grant licence to sell any timber, unless it be *sedente curia*, or after a writ of *Ad quod damnum*; and it hath been resolved by all the judges, that tho' justices in Eyre, and the King's officers within his Forests, have charge of venison, and of vert, or green hue, for the maintenance of the King's game, and all manner of trees for covert, browse, and pannage, yet when timber of the Forest is sold, it must be cut and taken by power under the Great Seal, or the Exchequer Seal, by view of the foresters, that it may not be had in places inconvenient for the game: And the justices in Eyre, or any of the King's officers in the Forest, cannot sell or dispose of any wood within the Forest without commission; so that the Exchequer and the Officers of the Forest have *divisum imperium*, the one for the profit of the King, the other for his pleasure. Also no officers of the Forest can claim Wind-falls, or Dotard trees, for their perquisites, because they were once parcels of the King's inheritance, but they ought to be sold by commission *for the King's best benefit*. Read. on Stat. P. 304, 305.

inspection of the Warders, Justices Itinerants, &c. and even trespasses done *de viridi* on boughs of trees, thickets, and the like, which (as has been shewed) are very great impediments to their growth and prosperity, should be duly looked after and punished, and the great neglect of Swainmote-courts reformed, &c. See Consuet. & Assis. Foref. Pannagium, or Pastura Pecorum & de Glandibus, Fleta, &c. Manwood's Forest-laws: Coke pla. fol. 366. lib. viii. fol. 138.

Finally, that the exorbitance and increase of devouring iron-mills were looked into as to their distance and number near the seas, or navigable rivers,—and what if some of them were even removed into another world, the *Holy Land* of New-England—for they will else ruin Old-England. It were better to purchase all our iron out of America, than thus to exhaust our woods at home, although (I doubt not) they might be so ordered as to be rather a means of preserving them. There was a statute made by Queen Elizabeth to prohibit the converting of timber-trees to coal, or other fuel, for the use of iron-mills, if the tree were of one foot square, and growing within fourteen miles of the sea, or the greater rivers. It is pity some of those places in Kent, Suffex, and Surry were excepted in the proviso, for the reason expressed in a statute made 23 Elizabeth, by which even the employing of any under-wood, as well as great trees, was prohibited within twenty-two miles of London, and many other navigable rivers, creeks, and other lesser distances from some parts of Suffex-Downs, Cinque-Ports, Havens, &c.

One Simon Sturtivant had a patent from King James I. 1612, pretending to save 300,000l. a year, by melting iron oar, and other metals, with pit-coal, sea-coal, and brush-fuel; it is pity it did not succeed.

There are several acres of wood-land, of no mean circuit, near Rochester, in the County of Kent, extending as far as Bexley, and indeed for many miles about Shooter's hill, near the river of Thames, which, were his Majesty owner of them, might in a few years be of an invaluable improvement and benefit, considering how apt they are to grow *forest*, and how opportune they lie for the use of the Royal Navy at Chatham.

But yet to prove what it is to manage woods discreetly: I read of one Mr. Christopher Darell, of Nudigate, a Surry Gentleman, that had a

Book III. particular indulgence for the cutting of his woods at pleasure, though a great iron-master, because he so ordered his works that they were a means of preserving even his woods, notwithstanding those insatiable devourers. This may appear a paradox, but it is to be made out; and I have heard my own father (whose estate was none of the least wooded in England) affirm, that a forge, and some other mills, to which he furnished much fuel, were a means of maintaining and improving his woods; I suppose by increasing the industry of planting and care, as what he left standing of his own planting, enclosing, and cherishing, (lately in the possession of my most honoured brother George Evelyn, of Wotton, in the same county, and now in mine) did (before the late hurricane) sufficiently evince: A most laudable monument of his industry and rare example; for without such an example, and such an application, I am no advocate for iron-works, but a declared Denouncer. But nature has thought fit to produce this wasting oar more plentifully in wood-land than any other ground, and to enrich our forests to their own destruction:

O semper bona Pauperies! & conditus altæ
 Thesaurus tellure nocens! O semper ovantes,
 Integræ, salvæque solo non divite Sylvæ! COULEN Pl. lib. vi.

O poverty! still safe; and therefore found
 Insep'vably with mischiefs under ground!
 Woods tall and reverend, from all time appear
 Inviolable, where no Mine is near.

For so our sweet Poet deplores the fate of the forest of Dean.

Our own law makes it waste to cut down high trees (though they be not properly timber) standing for safe-guard and defence of a mansion-house, though it be done for necessary repairs; whilst yet many (and with reason) hold it unhealthful to suffer a dwelling to be choaked with trees, for want of free passage to the air. To remedy this, there needs only a competent distance to be left void. But, as a Noble Person * observes, people in these days are so disposed to quarrel with timber, as there shall need no advice to demolish trees about their houses upon this account: In the mean time, as to the incroachment of trees so near our dwellings for the freer intercourse of air, the late dreadful *Sikvisfragi* storms have cleansed those places by a remedy worse than the disease, sufficient to deter us from

*Lord North.
 Oeconom.

planting not only too near our habitations, but from priding ourselves in our more stately avenues, the late boasts of our seats, as by sad experience myself and thousands more have found, that there is nothing stable in this world which *invisible spirits* cannot subvert and demolish, when God permits them to do *mischiefs*, and convince those who believe there are none because they do not see, though they feel their effects.

CHAP. VI.

As to the law of tithes, I find timber-trees pay none, but others do, both for body, branches, bark, fruit, root, and even the suckers growing out of them, and the tenth of the body sold or kept; and so of Willows, Sallows, and all other trees not apt for timber: Also of *Silva Cædua*, as coppices and underwoods, the tenth is paid whenever the proprietor receives his nine parts: But if any of these we have named unexempted, are cut only for mounds, fencing, or plow-boot within the parish in which they grow, or for the fuel of the owner, no tithes are due, though the Vicar have the tithe-wood, and the Parson that of the places so inclosed; nor are underwoods grubbed up by the roots tithable, unless for *this* and any of the former cases there be *Prescription*. But for timber-trees, such as Oak, Ash, Elm, (which are accounted timber in all places after the first twenty years) also Beech, Hornbeam, Maple, Aspen, and even Hazel, (many of which are in some countries reputed timber) they are not to pay tithes, unless they are felled before the said age of twenty years from their first planting.

See L. Bishop of Worcester concerning tithes of Parochial Clergy, P. 268.

Some think, and pretend, that no tithe is due where there is no annual increase, as corn and other grain, hay, and fruit of trees, and some animals; and that therefore *Silva Cædua*, till it become timber, is exempted: But a parliament at Sarum did make it tithable, in which are named even Willows, Alder, Beech, Maple, Hazel, &c.

In the Wild of Suffex, tithe-wood is not paid, as for faggots; but in the Downs they pay for both, as I am told; at which I wonder, there being so little wood at all upon them, or likely to have ever been.—Note here,

If the owner fell a fruit-tree, (of which the Parson has had tithe that year) and convert the wood into fuel, the tithe shall cease, because he cannot receive the tithe of one thing twice in one year.

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Beech, in countries where it abounds, is not tithable, because in such places it is not accounted timber. 16 Jac. Co. B. Pinder's Case.

Cherry trees, in Buckinghamshire, have been adjudged timber, and tithe-free. Pasch. 17 Jac. B. R.

If a tree be lopped under twenty years growth, and afterwards be permitted to grow past twenty years, and then be lopped again, no tithe is due for it, though at the first cutting it were not so.

If wood be cut for hedges, which is not tithable, and any be left of it unemployed, no tithe shall be paid for it.

If wood be cut for Hop-poles, (where the Parson or Vicar has tithe Hops) in this case he shall not have tithe of Hop-poles.

If a great wood consist chiefly of underwood tithable, and some great trees of Beech, or the like, grow dispersedly amongst them, tithe is due, unless the custom be otherwise; of all, both greater and lesser, together: And in like manner, if a wood consist for the most part of timber-trees, with some small scatterings of underwood amongst them, no tithe shall be paid for the underwood or bushes. Frin. 19 Jac. B. R. Adjudged 16 Jac. in C. B. Leonard's Case.

No tithe is to be paid of Common, of Estovers, or the Wood burnt in one's house.—Now as to the manner of payment:

To give the Parson the tenth acre of wood in a coppice, or the tenth cord, provided they are equal, is a good payment, and setting forth of tithe, especially if the custom confirm it.

The tithe of mast of Oak or Beech, if sold, must be answered by the tenth penny; if eaten by swine, the worth of it. And thus much we thought fit to add concerning Predial tithes: Who has a desire to be farther informed, may consult Charta de Foresta, with Manwood's Treatise of Forest Laws; Cromate on my Lord Coke's Reports, 11, 48, 49, 81. Plow. 470 Brownlow's Rep. 1 part 94. 2 part 150. D. and St. 169, &c. and that very useful, as well as compendious English Historical Library, part iii. chap. iv. lately published by the worthy Archdeacon, now Bishop of Carlisle.—But let us see what others do.

The King of Spain has, near Bilboa, sixteen times as many acres of coppice-wood as are fit to be cut for coal in one year; so that when it is ready to be felled, an officer first marks such as are like to prove ship-timber, which are let stand, as so many *sacred* and *dedicate* trees; by which means the iron-works are plentifully supplied in the same place, without at all diminishing the stock of timber. Then in Biscay again, every Proprietor plants three for one which he cuts down, and the law obliging them is most severely executed. See what we have already mentioned of the Duke of Lunenburg in this chapter, and that of the Walnut tree. There indeed are few or no coppices, but all are Pollards; and the very lopping, I am assured, does furnish the iron-works with sufficient to support them.

What the practice is for the maintaining of these kind of plantations in Germany and France, has already been observed to this illustrious Society by the learned Dr. Merret, viz. that the Lords and (for the Crown-lands) the King's Commissioners divide the woods and forests into eighty partitions, every year felling one of the divisions, so as no wood is felled in less than fourscore years: And when any one partition is to be cut down, the Officer or Lord contracts with the buyer, that he shall, at the distance of every twenty feet, (which is somewhat near) leave a good, fair, sound, and fruitful Oak standing: Those of betwixt forty and fifty years they reckon for the best, and then they are to fence these trees from all sorts of beasts and injuries for a competent time; which being done at the season, down fall the acorns, which (with the autumnal rains beaten into the earth) take root, and in a short time furnish all the wood again, where they let them grow for four or five years, and then grub up some of them for fuel, or transplantation, and leave the most *probable* of them to continue for timber.

The French King permits none of his Oak woods, though belonging (some of them) to Monsieur, his Royal Brother, in *Appanage*, to be cut down, till his own Surveyors and Officers have first marked them out; nor are any felled beyond such a circuit: Then are they sufficiently fenced by him who buys; and no cattle whatsoever suffered to be put in till the very seedlings (which spring up of the acorns) are perfectly out of danger. But these, and many other wholesome Ordinances, especially as they concern the Forest of Dean, we have comprised in the late statute of the twentieth of his Majesty's Reign, which I find enacted five years after the first Edition

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of this Treatise; and these laws are worthy our perusal: As also the statute prescribing a scheme of proportions for the several scantlings of building timber, (besides what we have already touched, book iii. chap. iv.) which you have 19 Car. II. entitled, “An Act for the rebuilding of London;” to which I refer the reader.

In the mean time, commissioners made purveyors for timber (though for the King’s use) cannot, by that authority, take timber-trees growing upon any man’s freehold, it being prohibited by Magna Charta, cap. xxi. *Nec nos nec Ballivi nostri, nec alii, capiemus Boscum alienum ad castra, vel ad alia agenda nostra, nisi per voluntatem illius cujus Boscus ille fuerit.*

* Affises Forestae, &c.

* See Groenzung de L. L. abrog. in Hollandia ad Tit. Arbor furt. Caesar. l. ii. (One cruelly whipped at the Hague.) See also Carpzovius in Praxi Crim. part ii. quest. 83. num. 2. seqq. and several others: The German Laws concerning Forests, are in abundance, and at large recited by Klochius and Pellerus.

We might here enlarge this title, by shewing how different the forest-laws are from the common-laws of England, both as to their antiquity, and extreme severity against all offenders, (of what degree soever) till the oppression was somewhat qualified by the *charta de foresta*, and afterwards by yet more favourable * concessions; since, indeed, our Kings, after the rigour and example of the stern Northern Princes, rendered it intolerable: But much of this concerned the preserving *Royal Game*; when as to timber trees, (like Germany) the whole island was almost but one vast forest and wood, so abounding, that what people might have had almost for carrying off the ground it grew on, is now grown so scarce in those very places as that fuel is sold by weight: I think Mr. Cambden mentions Oxfordshire, even so long since: And here I might mention that vast Caledonian forest, heretofore in Scotland, (whence the sea has its name, and the people Caledonians) having now not so much as a single tree to shew for it. Have we not then the greatest reason in the world to take all imaginable care for the preservation and improvement of this precious material?

We have said nothing of the laws against wood-stealers, (especially those who cut up to the very roots the most hopeful and thriving young Oaks, and sell bundles of them for walking-staves, &c.) severely * punished in other countries, but leave the rest to our learned in the laws, craving pardon for the errors I may have fallen into, by presuming to discourse of matters out of my Element and Profession.

CHAPTER VII.

*The Parænesis and Conclusion, containing some Encouragements and Proposals for the Planting and Improvement of his Majesty's Forests, and other Amœnities for Shade and Ornament. **

SINCE our forests are undoubtedly the greatest magazines of the wealth and glory of this nation, and our Oaks the truest oracles of its perpetuity and happiness, as being the only support of that navigation which makes us feared abroad, and flourish at home; it has been strangely wondered at by some good patriots, how it comes to pass, that many Gentlemen have frequently repaired, or gained a sudden fortune, by plowing part of their parks, and setting out their fat grounds to Gardeners, &c. and very wild wood-land parcels (as may be instanced in several places) to dressers of Hop-yards, &c. while the Royal Portion lies folded up in a napkin, uncultivated and neglected, especially those great and ample forests; where, though plowing and sowing have been forbidden, a Royal Command and Design may well dispense with it, and the breaking up of those intervals advance the growth of the trees to an incredible improvement.

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It is therefore insisted on, that there is not a cheaper, easier, or more prompt expedient to advance ship-timber, than to solicit, that in all his Majesty's Forests, Woods, and Parks, the spreading Oak, &c. (which we have formerly described) be cherished, by plowing and sowing Barley, Rye, &c. (with due supply of culture and soil between them) as far as may, without danger of the plow-share, be broken up. But this is only where these trees are arrived to some magnitude, and stand at competent distances; a hundred or fifty yards, (for their roots derive relief far beyond the reach of any boughs) as do the Walnut trees in Burgundy, which stand in their best plowed-lands.

But, that we may particularize in his Majesty's Forests of Dean, Sherwood, Enfield-Chase, &c. and in some sort gratify the quæries of the Ho-

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* This Chapter should constitute part of the Political Catechism of all Statesmen.

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nourable the Principal Officers and Commissioners of the Navy; I am advised by such as are every way judicious, and of long experience in those parts, that to enclose would be an excellent way: But it is to be considered, that the people, viz. Foresters and Borderers, are not generally so civil and reasonable as might be wished; and therefore to design a solid improvement in such places, his Majesty must assert his power, with a firm and high resolution to reduce these men to their due obedience, and to a necessity of submitting to their own and the publick utility, tho' they preserved their industry this way, at a very tolerable rate, upon that condition; while some person of trust and integrity did regulate and supervise the mounds and fences, and destine some portions, frequently set apart, for the raising and propagating of wood, till the whole nation were furnished for posterity.

Which work, if his Majesty shall resolve to accomplish, he will leave such an everlasting obligation on his people, and raise such a monument to his fame, as the ages for a thousand years to come shall have cause to celebrate his precious memory, and his Royal Successors to emulate his virtue. For thus (besides the future expectations) it would in present be no deduction from his Majesty's treasure, but some increase, and fall in time to be a fair and worthy accession to it; while this kind of propriety would be the most likely expedient to civilize those wild and poor Borderers, and to secure the vast and spreading heart of the forest, which, with all this indulgence, would be ample enough for a princely demesne: And if the difficulty be to find out who *knows* or *acknowledges* what are the Borderers, this article were worthy and becoming of as serious an inquisition as the legislative power of the whole nation can contrive.

The sum of all is, get the *Bordures* well tenanted, by long terms, and easy rents, and this will invite and encourage takers; whilst the middle, most secure, and interior parts would be a Royal Portion. Let his Majesty therefore admit of any willing adventurers in this vast circle for such enclosures in the precinct; and rather of more, than of few, tho' an hundred or two should join together for any enclosure of five hundred acres, more or less; that multitudes being thus engaged, the consideration might procure and facilitate a full discovery of latter encroachments, and fortify the recovery by favourable rents, improvements, and reversions by copyhold, or what other tenures and services his Majesty shall please to accept of.

Now for the planting of woods in such places (which is the main design of this whole Treatise) the hills and rough grounds will do well; but they are the rich fat vales and flats which do best deserve the charge of walls; such as that spot affords; and the Hawthorn well plashed, single or double, is a better and more natural fence than unmortared walls, could our industry arrive to the making of such as we have described: Besides, they are lasting and profitable; and then one might allow sufficient bordure for a mound of any thickness, which may be the first charge, and well supported and rewarded by the culture of the land thus enclosed.

For example: Suppose a man would take in five hundred acres of good land, let the mounds be of the wildest ground, as fittest for wood: Two hedges, with their vallations and trenches, will be requisite in all the round, viz. one next to the enclosure, the other about the thicket, to fence it from cattle: This, between the two hedges, of whatsoever breadth, is fittest for plantations. In these hedges might be tried the plantation of stocks, in the intervals all manner of wood-seeds sown, after competent plowings, as Acorns, Mast, Fir, Pine, Nuts, &c. the first year chasing away the birds, because of the Fir and Pine seeds, for reasons given. The second year loosening the ground, and thinning the supernumeraries, &c. this is the most frugal way: Or, by another method, the waste places of forests and woods (which by thorough experience is known and tried) might be perfectly cleansed; and then allowing two or three plowings, well rooted stocks be set, cut, and trimmed as is requisite; and that the timber-trees may be excellent, those afterwards coppiced, and the choicest stocks kept shreaded. If an enclosure be sowed, the seeds may be, as was directed, of all the species, not forgetting the best Pines, Fir, &c. Whiles the yearly removal of very incumbrances only will repay the workmen, who sell the Quick, or reserve it to store other enclosures, and soften the circumjacent grounds to the very great improvement of what remains.

And how if in such fencing-works we did sometimes imitate what Quintus Curtius, lib. vi. has recorded of the Mardorum Gens, near to the confines of Hyrcania, who did, by the close planting of trees alone upon the bordures, give so strange a check to the power of that great Conqueror Alexander. They were a barbarous people indeed, but in this worthy our imitation, and the work so handsomely and particularly described, that I shall not grieve to recite it: *Arbores densæ sunt ex industria confitæ, quarum teneros adhuc ramos manu flectunt, quos intortos rursus inferunt terræ: Inde,*

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velut ex alia radice letiores virent trunci: hos qua natura fert, adolescere non sinunt; quippe alium alii quasi nexu conserunt, qui ubi multa fronde vestiti sunt, operiunt terram. Itaque oculi nexus ramorum velut laquei perpetuâ sepe iter claudunt. "The trees," saith he, "were planted so near and thick together of purpose, that when the boughs were yet young and flexible, bent and wreathed within one another, their tops were bowed into the earth, as we submerge our layers; whence taking fresh roots, they shot up new stems, which not being permitted to grow as of themselves they would have done, they so knit and perplexed one within another, that when they were clad with leaves, they even covered the ground, and enclosed the whole country with a kind of living net, and impenetrable hedge." And this is not unlike what I am told is frequently practised in divers places of Devon; where the Oaks being planted very near the foot of those high mounds, by which they separate their lands, so root themselves into the bank, that when it falls and crumbles down, the fence continues still maintained by them with exceeding profit. Such works as these would become a Cato or Varro indeed, one that were *Pater Patriæ, non sibi soli natus*, born for posterity; but we are commonly of another mould:

——— & *fruges consumere nati.*

A fair advance for speedy growth and noble trees, especially for walks and avenues, may be assuredly expected from the grafting of young Oaks and Elms with the best of their kinds; and where the goodliest of these last are growing, the ground should be plowed and finely raked in the season when the scales fall, that the showers and dews fastening the seed where the wind drives it, it may take root, and hasten, as it will, to a sudden tree; especially if seasonable threading be applied, which has sometimes made them arrive to the height of twelve feet by the first three years; after which they grow amain. And if such were planted as near to one another as in the examples we have alledged, it is almost incredible what a paling they would be to our most exposed plantations, mounting up their *wooden walls* to the clouds. And indeed the shelving and natural declivity of the ground more or less to our unkind aspects, and bleak winds, does best direct to the thickening of these protections; and the benefit of that soon appears, and recompences our industry in the smoothness and integrity of the plantations so defended.

That great care be had of the seeds which we intend to sow, has been already advised; for it has been seen that woods of the same age, planted

in the same soil, discover a visible difference in the timber and growth; and where this variety should happen, if not from the seed, will be hard to interpret; therefore let the place, soil, and growth of such trees, from whence you have your seeds, be diligently examined; and why not this, as well as our care of animals for breed and store?

As to the form, obey the natural site, and submit to the several guises; but ever decline to enclose highways and common roads as much as possible. For the rest, be pleased to reflect on what we have already said to encourage the planting of the large spreading Oak above all that species; let the amplitude of the *distance* which they require be resigned to the care of the Verderer, for grazing cattle, deer, &c. Trees planted in this manner form, as it were, a wild *Quincunx* which presents to the eye a great and masculine beauty.

But to advance the Royal Forests to this height of perfection, I should again urge the removal of some of our most mischievously placed iron-mills; if that at least be true which some have affirmed, that we had better iron, and cheaper from foreigners, when those works were strangers amongst us. I am informed that the *New-Englisch* (who are now become very numerous, and hindered in their advance and prospect of the continent by their surfeit of the woods, which we want) did, about twelve years since, begin to clear their highways by two iron-mills. I am sure their *zeal* has sufficiently wasted our stately *Woods*, and *Steel* in the bowels of their *Mother Old-England*; and it were now but expedient their *Brethren* should hasten thither to supply us with iron for the peace of our days, whilst his Majesty becomes the great Sovereign of the *Ocean*, and of *free Commerce*; *Nemorum Vindex & Instaurator magnus*. This were the only way to render *both* our countries habitable indeed, and the fittest sacrifice for the Royal Oaks, and their Hamadryads, to whom *they* owe more than a slight submission: And he that should deeply consider the prodigious waste which these voracious iron and glass-works have formerly made but in one county alone, the county of Suffex, for one hundred and twenty miles in length, and thirty in breadth, (for so wide and spacious was the antient *Andradswald*, of old one entire wood, but of which there remains now little or no sign) would be touched with no mean indignation. I named the Suffex glass-works; but what spoil and prodigious consumption the salt-works had made in Worcester-shire, see the complaint of Mr. Camlden, speaking of Feckenham-Forest in his days, now necessitated to use other coal; certainly the goodly

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rivers and forests of the other *World* would much better become these destructive works, our *Iron* and *Saw-mills*, than these exhausted countries, and we prove gainers by the timely removal: I have said this already, and I cannot too often inculcate it for the concerns of a nation, whose only protection, under God, are her *Wooden Walls*.

Another thing to be recommended (and which would prove no less than thirty, in some places forty, and generally twenty years advance) were a good, if well executed, act to save our standards and bordering trees from the ax of the neighbourhood: And who would not preserve timber, when within so few years the price is almost quadrupled? I assure you standards of twenty, thirty, or forty years growth, are of a long day for the concerns of a nation.

And tho' we have, in our general chapter of coppices, declared what by our laws and common usage is expected at every fell, (and which is indeed most requisite, till our store be otherwise supplied) yet might much even of that rigour be abated, by no unfrugal permissions to take down more of the standards for the benefit of the underwoods, (especially where, by over-dropping and shade, they interrupt the kindly dews, rains, and influences which nourish them) provided that there were a proportionable number of timber-trees duly and thoroughly planted and preserved in the hedge-rows and bordures of our grounds; in which case, even the total clearing of some coppices would be to their great advance, as by sad experience has been taught some good husbands, whose necessities sometimes forced them to violate their standards, and more grown trees, during the late Tyranny.

Nor will it be here unreasonable to advise, that where trees are manifestly perceived to decay, they be marked out for the ax, that so the younger may come on for a supply, especially where they are chiefly Elms, because their successors hasten to their height and perfection in a competent time; but beginning once to grow sick of age, or other infirmity, suddenly impair, and lose much of their value yearly; besides, that the increase of *this*, and other speedy timber, would spare the Oak for navigation and the sturdier uses.

How goodly a sight were it, if most of the demesnes of our Country Gentlemen were crowned and incircled with such stately rows of Limes,

Firs, Elms, and other ample, shady, and venerable trees as adorn New-Hall in Essex, the seat of that Suffolk Knight, near Yarmouth; our neighbouring pastures at Barnes; with what has been planted of later years by the Illustrious Marquis of Worcester; the most accomplished Earl of Essex; and even in less fertile soils, though purer air, at Euston, by the Right Hon. the Earl of Arlington, Lord Chamberlain of his Majesty's Household; and at Cornbury, by the late Lord Chancellor, the Earl of Clarendon; and is done nearer this imperial city by the Earl of Danby, late Lord High Treasurer of England, at Wimbleton; the Noble Earl of Rochester (succeeding him in that supreme Office) at New-Park; the Duke of Norfolk at Albery, now the Lord Guernsey's; Sir Robert Cooke at Durdence, at Epsom, now my Lord Barkley's; and at Bedington, an antient seat of the Carews, famous for the first Orange trees planted in the naked earth one hundred years since, and still flourishing.

Besides what might have been seen, (as by me they were in perfection and with admiration) the Royal Seats of Oatland, Richmond, and above all Nonfuch, described by the judicious Cambden, with deserved Eulogies.

All these, and more, in my own sweet county of Surry, inferior to none for pleasure and salubrity of the air; to which we add the princely Seyourns of the adjoining county, Eltham and Greenwich, for its park and prospect, not only emulous, but in many respects exceeding that of the famous Thracian Bosphorus from Constantinople: That palace, namely at Greenwich, now turned into a stately and capacious college (the incomparable work of that accomplished architect Sir Christopher Wrenn) of which I had the honour to lay the first foundation stone, as the First Treasurer of that royal structure, erected for the reception and encouragement of emerited and well-deserving seamen and mariners, for its glorious fabrick and conveniencies exceeding any in Europe dedicated to that excellent purpose. To this also belongs a Park, as there did to that of Eltham. Nearer the metropolis yet are those of St. James's, Hyde-Park, and that sweet Villa (as now built, planted, and embellished) of Kensington, deserving a particular description; and for all that can be desirable of magnificence, Hampton Court, truly great, in a most beautiful Flat; the palace, gardens, canal, walks, groves, and parks; the sweet and silent Thames gliding her silver streams to the triumphal Winsonian Tempe, raising its stately head, and which alone has in view an

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hemisphere as far as eyes and telescopes can distinguish earth from heaven; thus from the Keape, the Terrace, Parks, and Forests, equalling, nay exceeding, any thing Europe can boast of.

Other there are sweet and delectable country seats and villas of the Nobles, rich and opulent citizens, (about our Augusta) built and environed with parks, paddocks, plantations, &c. adapted to country and rural seats, dispersed through the whole nation, conspicuous not only for the structure of their houses, built after the best rules of architecture, but for situation, gardens, canals, walks, avenues, parks, forests, ponds, prospect and vistas, groves, woods and large plantations, and other the most charming and delightful recesses, natural and artificial: But to enumerate and describe what were extraordinary in these and the rest, would furnish volumes: For who has not either seen, admired, or heard of

Audly-End, Althorp, Awkland, Allington, Amphil, Astwell, Aldermaston?

Bolsover, Badminton, Breckly, Burghly on the Hill, and the other Burghly, Bockton, Buckhurst, Buckland, Bellroiro, Blechington, Bestwood, Broom-hall?

Castle-Rising, Castle-Ashby, Chatworth, Charley, Cornbery, Casiabery, Cobham, Cowdrey, Caversham, Cranburn-Park, Charlton, Copt-Hall, Claverton, famous for Sir W. Basset's vineyard, producing forty hogheads of wine yearly. Nor must I forget that of Deepden, planted by the Honourable Charles Howard, of Norfolk, my worthy neighbour in Surry?

Drayton, Dorington-Park, Dean?

Eastwell, Euston, Ecleswold, Edscomb, Easton, Epping?

Falston, Flankford?

Graystock, Goodrick, Grooby, Grafton, Golden-Grove?

Holdenby, Haddon, Hornby, Hatfield, Haland, Hoathfield, Hinton, Holm-Pierpoint, Horftmounceaux?

Ichingfield?

Kirby, Knowesby?

Longleat, Latham, Lensal, Latimer, Lawnsborough?

More-Park, Mulgrave, Marlborough?

Normanby, North-Hall, Norborough, Newnham?

St. Otko, Oxnead?

Petworth, Penshurst, Paston-Hall?

Quarendon, Quickswood?

Ragland, Rutford, Ragbey, Ricot?

Sherborn, Sherley, Swallowfield, Shasford, Shaftsbury, Stansted,

Scots-Hall, Sands of the Vine?

Theobalds, Thorn-kill, Thorny?

Up-Park?

Wilton, Wrest, Woburn, Welbeck, Workfop, Woodstock, which, as Cambden tells us, was the first Park in England; as it is like to be one of the most magnificent and princely palaces and seats of that illustrious Hero, his Grace the Duke of Marlborough, to whose courage and conduct not the safety of the Empire alone, but of Europe is due, whilst the actions at Blenheim and Schellemburg may challenge equal trophies with Miltiades and Cæsar, at Marathon and Pharfalia.—But to proceed, Wimburn, Writtle-Park?

And generally all those seats which go under the names of Castles and Halls, as in Yorkshire, Essex, &c. were stored with noble parks full of timber, omitted here; which, but to have named, would over-swell the alphabet; without reckoning those of Ireland, which a few years since was an inexhaustible magazine of timber, destroyed by the Cromwellian Rebels, not only in that kingdom, but through all England: As to parks, there were more in this nation than in all Europe beside: And most of all that catalogue above-named, have yet their parks full of good timber-trees, industriously improved by the owners, since the spoil of the late Usurpers and Sequestrators.

To these should I add the vast forests, (most of them belonging to the Crown) as that of Dean, New-Forest, Windsor, Ashdown, Leonard, Sherewood, Epping, Panbet, Chute, &c. Forests for the most part without trees, and several of them together heretofore comprehended in that vast *Andradswald* already mentioned, of one county only. There were formerly twenty groves in Clarendon-Park near Salisbury, celebrated by Mesokerus, cited by Cambden, that were every one of them a mile in compass. In a word, to give an instance of what store of woods, and timber of prodigious size, there were growing in our little county of Surry, (with sufficient grief and reluctance I speak it) my own Grandfather had standing at Wotton, and about that estate, timber that now were worth 100,000*l.* Since of what was left my father, (who was a great preserver of wood) there has been 30,000*l.* worth of timber fallen by the ax, and

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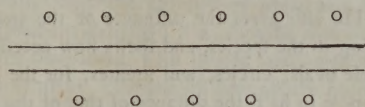
the fury of the late hurricane and storm: Now no more Wotton, stripped and naked, and ashamed almost to own its name.

Nehem. c. ii.
v. 18.

All which considered (for there are many other places and estates which have suffered the like calamity) should raise, methinks, a new spirit of industry in the Nobility and Gentry of the whole nation, like that with which Nehemiah inspired the Nobles as well as the People of the Captivity (than which nothing so much resembled that tedious slavery, and return from it, than did the Restoration of King Charles II.) *Let us arise up*, says the brave man, *and build; and so they strengthened their hands, for the people had a mind to the work.* And such an universal spirit and resolution to fall to planting, for the repairing of our wooden walls and castles, as well as of our estates, should truly animate us: *Let us arise then and plant*, and not give it over till we have repaired the havock our barbarous enemies have made: Pardon then this zeal, O ye lovers of your country, if it have transported me! To you Princes, Dukes, Earls, Lords, Knights, and Gentlemen, Noble Patriots, as most concerned, I speak, to encourage and animate a work so glorious, so necessary.

Of the noble Forest of Norimberg and its privileges, such care has been taken by many Emperors, that the very models of the plows are still preserved, drawn by above an hundred horses, (it being two hundred years since this Royal Plantation was begun) wisely presaging what ravage might be made by the spoil which the wars have since caused in that goodly country; which being then an almost continual forest, is now so sadly wasted. Nor has this been the fate of Germany alone, but of all the most flourishing parts of Europe, through the execrable and unsatiable ambition of those who have been the occasion of the ruin not only of these venerable shades, stately trees and avenues, (the graceful ornaments of the most princely seats) but of the miserable desolation of entire provinces, which their legions have left, with the inhuman murders of so many Christians, without distinction or just provocation! Mischiefs not to be repaired in many ages, the truculent and savage marks, among others, of a most *Christian King*, *Nomine non Re!* In the mean time, what provision this demolisher of woods in other countries makes to furnish and store his own dominions with so necessary a material, we have mentioned in this chapter; and how impolitic a waste there was of timber in France in John Bodin's time, see Repub. lib. vi. cap. i.

But leaving this sad and melancholy prospect, I return to the effects of peace, and it shall be to that plantation of Elms, carried out of England by Philip II. of Spain, to adorn his Royal Palace at Aranjuez, (of which I have already spoken, lib. i. cap. iv.) near Madrid in Spain: The palace is seated on the banks of the famous river Tagus, and the plantation on the north, where there is a piece of ground inclosed, formed into walks of six hundred and eighty yards long, and three hundred in breadth, in shape of a trapezium or parallelogram, about which the Tagus is artificially drawn to fence it. Next the river-side are more walks, not above twenty feet in breadth, for closer shade, planted on each side with double ranks of Elm, some of which are forty yards high, stript up to the top, and so near set as fifteen feet space: The second row is about six feet distant from the other; not planted exactly against its usual opposite, but the interval, and through the space between glides a narrow shallow channel of water, to refresh the trees upon occasion; thus,



Which is the method used in many ridings of Elm-walks, some of which are a league in length, adorning this seat beyond any palace, some think, in the world. Many of these indeed are on the decay, prejudiced by their being planted so near one another; but for all that, it takes not much from the beauty of the Vista, which is certainly the most surprizingly agreeable; to which the ample fountain, and noble statues in the cross-walks, make so glorious an addition as would require a particular description.

And now do I not for all this so magnify it, as if not to be paralleled in our own country; where, I dare affirm, there are many that exceed it, both in form and planting, (which has there several defects) but as we said, for an exotick example, so admired and celebrated by that boasting nation, as if the universe could not shew the like.

And what, in the mean time, can be more delightful than for noble persons to adorn their goodly mansions and demesnes with trees of venerable shade, and profitable timber? By all the rules and methods imaginable, to cut and dispose those ampler inclosures into lawns and ridings for exer-

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cise, health, and prospect, and for which I should here presume to furnish some farther directions, were it not already done to my hand by the often-cited Mr. Cooke, in that useful work of his; where, in the thirty-eighth chapter, he has laid down all that I can conceive necessary, by measures exactly taken from the middle line of any front, following the centre-stake, if it be for a walk: He there determines the wideness of the walk, according to its length, as forty feet to one of half a mile; if more, fifty or sixty; and if you withal desire shade, that then you should make three walks, the two collaterals twenty feet broad, to a middle one of forty, twenty-five to fifty, so that the middle be as wide as both the other: He likewise shews how proper it is that walks should not terminate abruptly, but rather in some capacious or pretty figure, be it circle, oval, semi-circle, triangle, or square, especially in parks, or where they do not lead into other walks; and even in that case, that there may gracefully be a circle to receive them: There he shews how to pierce a walk through the thickest wood, either by stakes set up where they may be seen to direct, or by candle and lanthorn in a calm night: He also gives the distances of the trees in relation to each other, according to the species, and shews how necessary it is to plant them nearer in those ovals, circles, and squares, for the better distinction of the figures, suppose to half the distance of that of the walks, and proportionable to the amplitude or smallness thereof. As for lawns, he advises that they should, if possible, be contrived on the south or east side of the seat or mansion, for avoiding the impetuosity of western winds; and that your best rooms may front those lawns and openings, and to screen from the occidental and afternoon's sun, which also hinders the prospect: A lawn on the north exposes the house to that piercing quarter, and therefore it should be well defended with the tallest trees: For the figure he commends the square, with three avenues breaking out at the three angles, or one at the angle opposite to the house; and these lawns may be bounded with walks, or a single row of Lime trees at competent distance: To which I add, the circle, with a star of walks radiating from it, likewise exceeding pleasant; such as the Right Hon. the Earl of Winchelsea has cut out at his noble seat in Kent; and since, far exceeding the most, at Long-Leats, the stately palace of the Lord Viscount Weymouth; at Badminton, the Duke of Beaufort's princely seat in Gloucestershire; at Ackdowne-Park in Berks, a most delightful solitude, from the centre of a large wood belonging to the Lord Craven; and in Worcestershire at Westwood, the mansion of Sir John Packington; besides those mentioned by Dr. Plot in his Natural History of Staffordshire, with many others; most of

which have been graphically plotted and designed (together with the seats, gardens, fountains, piscinas, plantations, avenues, vistas, and prospects about them) by Mr. Kniff, in near an hundred copper-plates; a most laudable undertaking, and becoming the encouragement of those noble persons, who would do honour to themselves, their families, and the whole nation.

But these incomparable amenities and undertakings will best of all become the inspection and care of the noble Owners, Lieutenants, Rangers, and ingenious Gentlemen, when they delight themselves as much in the goodness of their trees, as other men generally do in their dogs and horses, for races and hunting; neither of which recreations is comparable to that of planting, either for virtue or pleasure, were things justly considered according to their true estimation: Not that I am of so morose a humour, that I reprove any of these noble and manly diversions, seasonably used; but because I would court the industry of great and opulent persons to profitable and permanent delights: For, suppose *that* ambition were changed into a laudable emulation, who should best, and with most artifice, raise a plantation of trees, that should have all the proper ornaments and perfections their nature is susceptible of, by their direction and encouragement; such as *Ælian* sums up, lib. iii. cap. xiv. *ευγενεῖς οἱ κλάδοι, καὶ ἡ κόμη πολλή*, &c. kind and gentle limbs, plenty of large leaves, an ample and fair body, profound or spreading roots, strong against impetuous winds, (for so I affect to read it) extensive and venerable shade, and the like: Methinks this were as much a subject of glory as could be fancied of the kind; and comparable, I durst pronounce preferable, to any of their recreations; and how goodly an ornament to their demesnes and dwellings, let their own eyes be the judges.

One encouragement more I would reinforce from an history I have read of a certain frugal and most industrious Italian Nobleman, who, after his Lady was brought to bed of a daughter, (considering that wood and timber was a revenue coming on whilst the owners were asleep) commanded his servants immediately to plant in his lands, which were ample, Oaks, Ashes, and other profitable and marketable trees, to the number of an hundred thousand; as undoubtedly calculating, that each of those trees might be worth twenty-pence, before his daughter became marriageable, which would amount to 100,000 Francs, (near ten thousand pounds sterling) and this he intended to be given with his daughter for a portion. This

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was good philosophy, and such as I am assured was frequently practised in Flanders upon the very same account: Let us see it once take effect amongst our many slothful Gentry, who have certainly as large demesnes, and yet are so deficient in that decent point of timely providing for their numerous children; and those who have none, let them the rather plant: Trees and Vegetables have perpetuated some names longer and better than a pedigree of a numerous offspring, as I have already shewed; and it were a pledge of a noble mind, to oblige the future age by our particular industry, and by a long lasting train, with the living work of our own hands. But I now proceed to more general concerns in order to the Quæries; and first to the proportion:

It were but just, and infinitely befitting the miserable needs of the whole nation, that every twenty acres of pasture made an allowance for half an acre of timber; the ground dug about Christmas, casting the grassy-side downwards till June; then dug again, and about November stirred afresh, and sown with mast, or planted in a clump, well preserved and fenced for fourteen or fifteen years, unless that sheep might haply graze after four or five years: And where the young trees stand too thick, there to draw and transplant them into the hedge-rows, which would also prove excellent shelter for the cattle: This husbandry would more especially become Northamptonshire, Lincolnshire, Cornwall, and such other of our countries as are the most naked of timber, fuel, &c. and unprovided of covert; for it is rightly observed, that the most fruitful places least abound in wood, and do the most stand in need of it:

1.

Example by Leicestershire;

What soil can be better than that
For any thing heart can desire?
And yet doth it want ye see what;
Mast, covert, close pasture, and wood,
And other things needful, as good.

2.

More plenty of mutton and beef,
Corn, butter, and cheese of the best,
More wealth any where (to be brief)
More people, more handsome, and prest,

Where find ye (go search any coast)
 Than there where inclosure is most?

3.

More work for the labouring man,
 As well in the town as the field;
 Or thereof (devize, if ye can)
 More profit what countries do yield?
 More seldom where see ye the poor
 Go begging from dooz to dooz?

4.

In wood-land the poor men that have
 Scarce fully two acres of land,
 More merrily live, and do save
 Than t'other with twenty in hand:
 Yet pay they as much for the two
 As t'other for twenty must do.
 If this same be true, as it is,
 Why gather they nothing by this?

Thus honest Tusser, above an hundred years since, and the whole age has justified it; since it is evident, that by inclosure, and this diligent culture, the very worst Land of England would yield tenfold more profit than that which is here celebrated for the best and richest spot of it.

Such as are ready to tell you their lands are so wet that their woods do not thrive in them, let them be converted to pasture, or bestow the same industry on them which good husbands do in meadows by *draining*; which instead of those narrow rills (gutters rather) might be reduced to a proportionable canal, cut even and straight, the earth taken out and spread upon the weeping and uliginous places; nor would the charge be so much as that of the yearly and perpetual renewing and cleansing of those numerous and irregular sluices; besides, there is a profit in storing the canal with fish.

It is a slothfulness to do otherwise, since it might be effected in few years, by continually, and by degrees making the middle cut large, where it cannot be so conveniently done at once, and the pains would certainly

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be as fully recompensed in the growth of their timber as in that of their grafts: Where poor hungry woods grow, rich corn, and good cattle would be more plentifully bred; and it were beneficial to convert some woodland (where the proper virtue is exhausted) to pasture and tillage, provided that fresh land were improved also to wood in recompence, and to balance the other.

Where we find such *uliginous* and starved places, (which sometimes obey no art or industry to drain, and of which our pale and fading corn is a sure indication) we are as it were courted to obey nature, and improve them from the propagation of Sallows, Willows, Alders, Abele, Black-Cherry, Sycamore, Aspen, Birch, and the like hafty and profitable growers, by ranging them, casting of ditches, trenches, &c. as before has been taught.

In the mean while, it is a thing to be deplored that some persons bestow more in grubbing and dressing a few acres, which have been excellent wood, to convert them into wretched pasture, not worth a quarter of what the trees would have yielded, well ordered, and left standing, since it is certain, that barren land planted with wood will treble the expence in a short time. Of this, the Right Honourable the Lord Viscount Scudamore may give fair proof, who having felled (as I am credibly informed) a decayed wood, intended to set it to tenants; but upon second thoughts (and for that his Lordship saw it apt to cast wood) inclosed and preserved it. Before thirty years were expired it yielded him near 1000l. upon wood-falls, whereas the utmost rent of the whole piece of land yearly was not above 8l. 10s. The like I am able to confirm by instancing a Noble Person, who, a little before our unhappy wars, having sown three or four acres with acorns, the fourth year transplanted those which grew too thick, all about his Lordship. These trees are now* of that stature, and so likely to prove excellent timber, that they are already judged to be almost as much worth as the whole demesne; and yet they take off nothing from other profits, having been discreetly disposed of at the first designment. And supposing the longevity of trees should not extend to the periods we have, upon so good account, produced; yet, neither is their arrival to a very competent perfection so very discouraging: since I am credibly informed, that several persons have built of timber, and that of Oak, which were acorns within these forty years; and I find it credibly reported, that even our famous Forest of Dean hath been utterly

* 1664.

wafted no lefs than three feveral times within the fpace of nine hundred years. The Prince Ele&tor, Frederick IV. in the year 1606, fowed a part of that moft barren heath of *Lambergheim* with acorns after plowing, as I have been informed: It is now * likely to prove a moft goodly foreft, though all this while miferably neglected by reafon of the wars. For the care of planting trees fhould indeed be recommended to Princes and great Perfons, who have the fee of the eftate; tenants upon the rack, by reafon of the tedious expectation, and jealousy of having their rents enhanced, are, for the moft part, averfe from this Huſbandry; fo that unlefs the Landlord will be at the whole charge of planting and fencing, (without which as good no planting) little is to be expected; and whatfoever is propoſed to them above their uſual courſe, is looked upon as the whim and fancy of speculative perfons, which they turn into ridicule when they are applied to action; and this (ſays an ingenious and excellent Huſband, whoſe obſervations have afforded me no little treaſure) might be the reafon why the prime writers of all ages endeavoured to involve their diſcourſes with allegories, and ænigmatical terms, to protect them from the contempt and pollution of the Vulgar, which has been of ſome ill conſequence in huſbandry; for that very few Writers of worth have adventured upon ſo plain a ſubject, though doubtleſs, to any conſidering perſon, the moſt delightful kind of Natural Philoſophy, and that which employs the moſt uſeful part of the Mathematicks.

* 1664.

The Right Honourable the late Lord Viſcount Mountague has planted many thouſands of Oaks, which, I am told, he drew out of coppices, big enough to defend themſelves; and that with ſuch ſucceſs as has exceedingly improved his poſſeſſions; and it is a worthy example: To conclude, I could have ſhewn an avenue planted to a houſe ſtanding in a barren park, the ſoil a cold clay; it conſiſted totally of Oaks, one hundred in number: The perſon who firſt ſet them, dying very lately, lived to ſee them ſpread their branches one hundred and twenty-three feet in compaſs, which, at the diſtance of twenty-four feet, mingling their ſhady treſſes for above a thouſand in length, formed themſelves into one of the moſt venerable and ſtately arbor-walks that in my life I ever beheld: This was at Baynards in Surry, and belonging lately to my moſt honoured Brother (a moſt induſtrious planter of wood) Richard Evelyn, Eſq;—ſince tranſplanted to a better world: The walk is fifty-fix feet broad, one tree with another containing, by eſtimation, three quarters of a load of timber, and in their lops three cords of fire-wood: Their bodies were not of the tallſt,

BOOK III. having been topped when they were young, to reduce them to an uniform height; yet was the timber most excellent for its scantling; and for their heads, few in England excelling them: Where some of their contemporaries were planted single in the park without cumber, they spread above fourscore feet in arms; all of them since cut down and destroyed by the person who continued to detain the just possession of that estate from those to whom of right and conscience it belonged. Since then it is disposed of, and I am glad it has fallen into the hands of the present Possessor.

But I have some few instances to superadd, of no mean encouragement, before I dismiss my Reader, because they are so very pregnant and authentic. Sir Thomas Southwell, after he had sold and felled all the timber and underwood in a certain parcel of land lying in Carbrook, in the county of Norfolk, called by the name of *Latimer-Wood*, containing eighty acres, (now, as I understand, belonging to Sir Robert Clayton, Knight) granted a lease of the said ground, with other land, to one Thomas Wastney, the father, with liberty to grub and stub up all the wood and stub-shoots remaining, and to clear the said ground for pasture or tillage, as he should think to be most for his profit and advantage: Accordingly he puts out the same to labourers to stub and clear; but was, it seems, persuaded by one of them, to preserve some of the young stands or saplings then growing there, as that which might be of greater emolument to him before the expiration of the lease, than if he should quite extirpate them, and convert the said ground to tillage; these saplings were then so small, as when it happened that any of the labourers did break the haft of his mattock, he could hardly find one amongst them big enough to make another of for his present use: Nay, when the said labourers had made an end of clearing the ground of the old stub-shoots, upon which the timber and underwood did grow, (which is now fifty years since) there was not a tree left growing in it, that could be valued at above threepence, to be felled for any use or service. About the year 1650, the estate being then come (after the death of Sir Richard Crane, Knight) to William Crane, Esq; and the lease of the same to Thomas Wastney, the son, he offered five hundred of the best of the said young Oak saplings to one Daniel Hall, a dealer in timber, for two shillings and sixpence the tree; which he refusing to give, the said Thomas Wastney making his application to Mr. Crane above-mentioned, (then owner of the estate) and desiring Daniel Hall to acquaint him what pity it was to cut down such young and thriving trees, Mr. Crane was persuaded to allow the said Thomas Wastney

fourscore pounds to let them stand; since which time, the said Mr. Crane sold as many of those trees and saplings as came to about forty pounds, and left growing, and remaining on the ground, about thirteen hundred and eighty trees; which, in August 1675, being (upon the desire of Mr. Crane) valued by the said Daniel Hall, were estimated to be worth 700*l.* himself since offering for some of the said trees forty or fifty shillings a tree; five hundred of them being better worth than 500*l.* Now the said Latimer-Wood, were it cleared of the timber, would not be let for above four or five shillings per acre at the most. The particulars of this history I received under the hands and certificates of the above-mentioned Daniel Hall, who is the Timber-merchant, and two of the stubbers or labourers, yet living, that were employed to clear the ground. I have likewise transmitted to me this account from Mr. Sharp, under the hand of Robert Daye, Esq; one of his Majesty's Justices of the Peace for the county of Norfolk, as followeth:

There were, in 1636, an hundred timber-trees of Oak, growing on some grounds belonging then to Thomas Daye, of Scopleton, in the county of Norfolk, Esq; which were that year sold to one Robert Bowgeon of Hingham, in the said county, for 100*l.* which price was believed to be equal, if not to surmount their intrinsic worth and value; but, after agreement made for them, a refusal happening, (which continued the trees standing till the year 1671) those very trees were sold to Thomas Ellys of Windham, Timber-master, and one Henry Morley, Carpenter, by Mr. Daye (son of the said Thomas Daye, Esq;) for 560*l.* And this comes to me attested under the hand of Mr. Daye himself, dated May 4, 1678. *

From the same Mr. Sharp I receive this instance of an Ash planted by the hands of one Mr. Edm. Salter, in that county, which he sold for 40*s.* before his death; but this is frequent.

I am likewise assured that three acres of barren land, sown with acorns about sixty years since, are now become a very thriving wood: The improvement of those few acres amounts to 300*l.* more than the rent of the land, and what it was before worth to be sold. Once more, and I have done.

N O T E S.

* A few years ago, one hundred Oak Trees growing in the park at Nostell, the seat of Sir Rowland Winn, Bart. were sold for 5000*l.*

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Upon the estate of George Pitt, Esq; of Stratfieldsea, in the county of Southampton, a survey of timber being taken in the year 1659, it came to 10,300 l. besides near 10,000 samplers not valued, and growing up naturally: Since this, there hath been made by several sales 5600 l. and there has been felled for repairs, building, and necessary uses, to the value (at the least) of 1200 l. so as the whole falls of timber amount to 6800 l. The timber upon the same ground being again surveyed *Anno* 1677, appeared to be worth above 21,000 l. besides eight or nine thousand samplers and young trees to be left standing, and not reckoned in the survey: But what is yet to be observed, most of this timber above-mentioned, being Oak, grows in hedge-rows, and so as that the standing of it does very little prejudice to the plough or pasture.

It is likewise affirmed, that upon a living in the same place, of about 40 l. rent *per Ann.* there were (by an estimation taken in the year 1653) three hundred thirty-eight young timber-trees, valued at 59 l. the saplings at 31 l. 14 s. And upon a later survey, taken the last year, 1677, the worth of the timber on that living is valued at above 800 l. besides four or five hundred young thriving trees, which have, since the survey in 1653, grown naturally up, not reckoned in this account. With such, and the like instances, coming to me from Persons and Gentlemen of unquestionable credit, (disperfed through several other counties of this nation) I might furnish a just volume; and I have produced these examples because they are conspicuous, full of encouragement, worthy our imitation; and that from these, and sundry others which I might enumerate, we have made this observation, that almost any soil is proper for some profitable timber-trees or other, which is good for very little else.

Besides common pasture which has long been fed and is the very best meadow, that is up-land and rich, and such as we find to be naturally *Wood-severe*, as they term it, the bottoms of Downs, and like places well plowed and sown, will bear lusty timber, being broken up, and let lie till Midsummer, and then stirred again before sowing about November.

Mr. Cooke's directions are these: Prepare as for sowing of barley; about February scatter your seeds: If you plow your ground into great ridges, the thickness of the earth on the top will afford more depth and nourishment for the roots, and the furrows being filled up with leaves, when rotten, will lead the roots from one ridge to another: In dry ground

plow the ridges cross the descent, not to drain, but keep the water on the ground; but in wet lands, contrary: This I hold to be an excellent note: He conceives the barley season to be of the latest to sow your seeds, but with oats it does well, so you sow them not too thick; but it is best of all to sow them by themselves, without any crop of grain at all.

A more expeditious way is to plant with sets, making holes or fosses (which are best) two feet wide, and deep, and about half a rod distant, viz. four in every rod square, two sets in each hole, sowing your keys and seeds among them the ensuing spring, and that continued as oft as you find *stampings* and *keys* to be had, even till your wood be perfectly furnished, only taking care that they lie not long too thick, because it will heat and burn the kernels; and therefore let them be put into the ground as soon as they are pressed, or else lay them thin, or parted with straw.

In case your land be poor, and wanting depth, or but indifferent, observing the posture of your ground, divide it into four yards distance at both extrems, by small stakes, making rows of them, by setting up some few between them, to direct and lay your work straight, plowing one yard of each side of the stakes, if the ground be green sward, for the easier running of the roots: Having thus plowed two yards, and left two unplowed through your whole piece, some short time before the planting season, so soon as the fall of the leaf begins, dig up the unplowed interstices, laying one half of the earth on the unplowed pieces, and the other half upon the rest; and as you do this, plant your prepared sets about a yard distant, with store of fallow or other cuttings with them, digging that ground which you laid on the plowed part a good spade deep, which will make it near a foot thick to plant your sets in: Thus proceed from one unplowed ground to another, till all of it is planted: Two men on each side of the ridges will soon dispatch the work, which should be finished by the latter end of January, which is the best time for the sowing your keys, nuts, and other seeds, unless the weather be frosty, in which case you may a little defer it: And when all is sowed, cover them a little with the shovelings of some ditches, pond, or other stuff, as an assured good way to improve such grounds to considerable advantage.

For the planting of Walnuts, Chesnuts, Cyder-Apples, or any other Forest or Fruit-trees, in open fields, Mr. Cook directs how the trian-

BOOK III. gular form exceeds all the rest for beauty and advantage, I refer you to his 33d chapter.

An old and judicious planter of woods prescribes us these directions for improving of sheep-walks, downs, heaths, &c. Suppose on every such walk, on which five hundred sheep might be kept, there were plowed up twenty acres, (plowed pretty deep, that the roots might take hold, and be able to resist the winds) this should be sowed with Mast of Oak, Beech, Chats of Ash, Maple-keys, Sloes, Service-berries, Nuts, Bulace, Haws, and bruised Crabs, mingled and scattered about the sides and ends of the ground, near a yard in breadth. On the rest sow no Haws, but some few Crab-kernels; then begin a side, and sow five yards broad, plowing under the Mast, &c. very shallow; then leave six yards in breadth, and sow and plow five yards more; and so from side to side, remembering to leave a yard and half at the last side; let the rest of the head-lands lie till the remainder of the Close be sown in March with Oats, &c. to preserve it from hurt of cattle, and poaching the ground: When the spring is of two years growth, draw part of it for Quick-sets; and when the rest of the trees are of six years shoot, exhaust it of more, and leave not above forty of either side, each row five yards distant, and here and there a Crab-stock to graff on, and in the invironing hedge (to be left thick) let the trees stand four yards asunder; which if forty-four were spared, will amount to above four thousand trees. At twenty years end, stock up two thousand of them; lop a thousand more every ten years, and reserve the remaining thousand for timber. Judge what this may be worth in a short time, besides the grass, which will grow the first six or seven years, and the benefit of shelter for sheep in ill weather, when they cannot be folded; and the pasture which will be had under the trees, now at eleven yards interval, by reason of the stocking up those two thousand we mentioned, excepting the hedges; and if in any of these places any considerable waters fortune to lie in their bottoms, fowl would abundantly both breed and harbour there. These are admirable directions for park-lands, where shelter and food is scarce.

Even in the most craggy, uneven, cold, and exposed places, not fit for arable, as in Biscay, &c. and in our very peaks of Derbyshire, and other rocky places, Ashes grow about every village; and we find that Oak, Beech, Elm, and Ash will prosper in the most stony soils. And it is truly from these indications, more than from any other whatsoever that a broken

and decaying Farmer is to be distinguished from a substantial Freeholder, the very trees speaking the condition of the Master. Let not then the Royal Patrimony bear a Bankrupt's reproach. But to descend yet lower :

Had every acre but three or four trees, and as many of fruit in it as would a little adorn the hedge-rows, the improvement would be of fair advantage in a few years ; for it is a shame that Turnip-planters should demolish and undo hedge-rows near London, where the mounds and fences are stripped naked, to give fun to a few miserable roots, which would thrive altogether as well under them, being skilfully pruned and lopped : Our Gardeners will not believe me, but I know it to be true, though Pliny had not affirmed it. As for Elms, saith he, their shade is so gentle and benign, that it nourishes whatsoever grows under it ; and (lib. xvii. cap. xxii.) it is his opinion of all other trees, (very few excepted) provided their branches be pared away ; which being discreetly done, improves the timber, as we have already shewed.

Indeed, where Elms are planted either about very small crofts or avenues reserved for pasture, the roots are apt to spring up and annoy the grafs : But I speak of the larger field, and even in the former, that part of the root which spreads into the field, may (as I have shewn) be hindered from infecting it, by cutting away those fibres which run into the field, without any impeachment to the growth of the trees, of which I have some whose roots are cut off very near the main stems at one side, thriving almost altogether as well as those which have their roots entire.

Now let us calculate a little at adventure, and much within what is both feasible and very possible, and we shall find, that four fruit-trees in each acre throughout England, the product sold but at six pence the bushel, (but where do we now buy them so cheap?) will be worth a million yearly. What then may we reasonably judge of timber, admit but at the growth of four pence per acre yearly, (which is the lowest that can be estimated) amounting to near half a million, if (as it is supposed) there may be five or six and twenty millions of square acres in the kingdom, (besides fens, highways, rivers, &c. not counted) and without reckoning in the mast or loppings ; which whosoever shall calculate from the annual revenue the *mast* only of Westphalia (a small and wretched country in Germany) does yield to that Prince, will conclude to be no despicable improvement.

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In this poor territory, every Farmer does by antient custom plant so many Oaks about his farm as may suffice to feed his swine. To effect this, they have been so careful, that when of late years the armies infested the poor country, (both Imperialists and Protestants) the single Bishoprick of Munster was able to pay one hundred thousand crowns per annum, (which amounts of our money to about 25,000 l. sterling) besides the ordinary entertainment of their own Princes and private families. This being incredible to be practised in a country so extremely barren, I thought fit to mention, either to encourage or reproach us. General Melander was wont to say, the good husbandry of their ancestors had left them this stock *pro sacra anchorâ*; considering how the people were afterwards reduced to live even on their trees, when the soldiers had devoured their hogs; redeeming themselves from great extremities, by the timber which they were at last compelled to cut down, and which, had it continued, would have proved the utter desolation of that whole country.

I have this instance from my most worthy and honourable friend Sir William Curfius, late his Majesty's Resident in Germany, who received this particular from the mouth of Melander himself. In like manner, the Princes and Freedoms of *Hesse, Saxony, Thuringia*, and divers other places there, make vast incomes of their forest-fruit (besides the timber) for swine only: So as in a certain wood in *Hessia* only, twenty thousand have been fattened, yielding the Prince 30,000 florins.

I say then, whosoever shall duly consider this, will find planting of wood to be no contemptible addition, besides the pasture much improved, the cooling of fat and heavy cattle, keeping them from injurious motions, disturbance, and running as they do in summer, to find shelter from the heat and vexation of flies.

But I have done, and it is now time to get out of the wood, and to recommend this, and all that we have proposed, to his Most Sacred Majesty, the Honourable Parliament, and to the Lord High Treasurer, principal Officers, and Commissioners of the Royal Navy; that where such improvements may be made, they be speedily and vigorously prosecuted; and where any defects appear, they may be duly reformed.

And what if, for this purpose, there were yet some additional Office constituted, which should have a more universal inspection, and the charge of

all the Woods and Forests in his Majesty's Dominions? This might easily be performed by Deputies in every County; persons judicious and skilful in Husbandry, and who might be repaired to for advice and direction: And if such there are at present, (as indeed our laws seem to provide) that their power be sufficiently amplified where any thing appears deficient; and as their zeal might be excited by worthy encouragements, so might neglects be encountered by a vigilant and industrious check. It should belong to their province to see that such proportions of timber, &c. were planted and set out upon every hundred, or more of acres, as the Honourable Commissioners have suggested; or as might be thought convenient, the quality and nature of the places prudently considered. It should be their office also to take notice of the growth and decay of woods, and of their fitness for publick uses and sale, and of all these to give advertisements, that all defect in their ill governing may be speedily remedied; and the superior Officer or Surveyor should be accountable to the Lord Treasurer, and to the principal Officers of his Majesty's Navy for the time being. And why might not such a regulation be worthy the establishing by some Solemn and Publick Act of State, becoming our Glorious Prince, SOVEREIGN OF THE SEAS! and his prudent Senate, the present Parliament?

But to shew how this *Xilotrophia* Studium for the preservation of timber was honoured,

We find in Aristotle's *Politics*, the Constitution of Extra-urban Magistrates to be *Silvarum Custodes*; and such were the *Consulares Silvae*, which the Great Cæsar himself (even in a time when Italy did abound in timber) instituted; and was one of the very first things which he did, at the settling of that vast Empire, after the Civil Wars had exceedingly wasted the country. Suetonius relates it in the Life of Julius; and Peter Crinitus, in his fifth book *De Honesta Disciplina*, cap. iii. gives this reason for it, *Ut materies, faith he, non deesset, qua videlicet Navigia publica possent à præfecturis fabrum, confici.* True it is, that this Office was sometimes called *Provincia minor*; but for the most part annexed and joined to some of the greatest Consuls themselves; that facetious Sarcastm of the Comedian (where Plautus names it *Provincia caudicaria*) referring only to some under officers, subservient to the other. And such a charge is at this day extant amongst the noble Venetians, who have near *Trivisti* (besides what they nourish in other places) a goodly forest of Oaks, preserved as a Jewel, for the only

De collegiis
Fabrorum,
Centonario-
rum, & Dendrophorum,
Naviculariorum,
rarium exercit.
& Caudicarium,
plurimæ extant
Inscriptiones apud
Lipsum in
lib. Inscip.
antiq. quales
Bergomerium
Brixianorum,
Comensium,
Lugdunensium,
Araricorum &
Rhodanicorum,
eorumque corporum,
& Collegiorum patronis
curatoribus. Vide
etiam Hieron.
Rubeum, l. i. Hist.
Ravennat. Item de
Dendrophoris.
Cod. Theodosii, lib. i. &
ii. isdem verbis
inscript: Morisot. Orb.
Marit. lib. i.
cap. xxiv.

Book III.

use of the arsenal, called the *Montello*; and this is carefully supervised by a certain Officer whom they name *il Capitano*. The like have the Genoëzes for the care of the goodly forests of *Attone*, in the Island of Corsica, full of goodly Oaks and other timber; which not only furnish that state with sufficient materials to build their own gallies, and other vessels, but so many for sale to other nations, that since the late insult the French Monarch made upon that glorious city, he has haughtily forbid them to traffick any more with strangers, by supplying them as heretofore, to their great detriment and loss: This timber is, of such a grain and quality, as tho' felled in the new moon, it is not at all impaired.

We might, besides all these, instance in many other prudent states; not to importune you with the express laws which Ancus Martius, the Nephew of Numa, and other Princes long before Cæsar, did ordain for this very purpose; since, indeed, the care of so publick and honourable an enterprise as is this of planting and improving of woods, is a right Noble and Royal Undertaking; as that of the Forest of Dean in particular, were it bravely managed, an Imperial Design; and I do pronounce it more worthy of a Prince, who truly consults his glory in the highest interest of his subjects, than that of gaining battles, or subduing a province.

And now after all this, and the directions and encouragements enumerated in this chapter, together with the most important concerns of these dominions, I list not to declare by whose negligence so little effects appear of these *improvements*, which might by this time have been made in the Royal Magazine, ever since the first edition of this Treatise*; though the Officers then intrusted, and whose duty it was, be now no more. I cannot, however, but call to mind how seemingly solicitous and earnest the Commissioners were I should digest and methodize the papers I laid before them on this subject, with a zeal becoming Publick Spirits, (as under their hands I have to shew) whilst the putting it in practice to any laudable degree, was soon cast by as a project scarce worth the while. I again affirm, that had these advantages of forest culture been then vigorously encouraged and promoted, there had now been of those materials infinite store, even from the very acorn and seminary, a competent advance of the most useful timber for the building of ships, (as I think is sufficiently made out) since

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* This takes in a period of forty years, viz. from the first appearance of the *Silva* in 1664, to the publication of the fourth edition in 1704.

his late Majesty's Restoration. The want of timber, and the necessity of being supplied by foreign countries, if not prevented by better and more industrious instruments, may prove in a short time a greater mischief to the publick than the late diminution of the coin. I wish I prove no prophet, whilst I cannot for my life but often think of what the learned *Melancthon* above an hundred years since was wont to say (long before those barbarous wars had made these devastations in Germany) That the time was coming, when the want of *three* things would be the ruin of Europe, *Lignum, probam Monetam, probos Amicos*; Timber, good Money, sincere Friends. How far we see this prediction already verified, let others judge: And if what I here have touched with some resentment in behalf of the publick and my country, in this rustick Discourse, using the freedom of a plain Forester, seems too rude, it is the Person I was commanded to put on, and my Plea is ready,

Ἀνὸς παρούσης, πᾶς ἀνὸς ἐυέλκται.

Præfente Quercu, ligna quivis colligit.

For who could have spoken less upon so ample a subject? And therefore I hope my zeal for it in these Papers will excuse the prolixity of this digression, and all other the imperfections of my services.

Si canimus Silvas, Silvæ sunt consule dignæ.

APPENDIX to the NOTES on the Chapter of the OAK.

Since these sheets were printed off, I have been favoured with the following curious and interesting account of the uses of OAK LEAVES in Hot-houses.—The idea is quite new, and I entertain a perfect confidence in the whole narrative, it having been communicated to me by Mr. Speechly, Gardener to his Grace the Duke of Portland, by order of his Grace.

THE EDITOR.

“————— I presume that the leaves of the Oak abound with the same quality as the bark of the tree, therefore the sooner they are raked up after they fall from the trees, the better, as that quality will naturally decrease during the time they are exposed to the weather. After being raked into heaps they should immediately be carried to some place near the Hot-houses, where they must lie to *Couch*. I generally fence them round with Charcoal-hurdles, or any thing else to keep them from being

blown about the garden in windy weather. In this place we tread them well, and water them in case they happen to have been brought in dry. We make the heap six or seven feet in thickness, covering it over with old mats, or any thing else, to prevent the upper leaves from being blown away. In a few days the heap will come to a strong heat. For the first year or two that I used these leaves, I did not continue them in the heap longer than ten days or a fortnight; but in this I discovered a considerable inconvenience, as they settled so much when got into the Hot-house as soon to require a supply. Taught by experience, I now let them remain in the heap for five or six weeks, by which time they are properly prepared for the Hot-houses. In getting them into the Pine-pits, if they appear dry, we water them again treading them in layers exceedingly well till the pits are quite full. We then cover the whole with Tan to the thickness of two inches, and tread it well till the surface become smooth and even. On this we place the Pine-pots in the manner they are to stand, beginning with the middle row first, and filling up the spaces between the pots with Tan. In like manner we proceed to the next row till the whole be finished; and this operation is performed in the same manner as when Tan *only* is used.

“After this the leaves require no farther trouble the whole season through, as they will retain a constant and regular heat for twelve months without either stirring or turning; and if I may form a judgment from their appearance when taken out, (being always entire and perfect) it is probable they would continue their heat through a second year; but as an annual supply of leaves is easily obtained, such a trial is hardly worth the trouble of making.

“After this the Pines will have no occasion to be moved but at the stated times of their management, viz. at the shifting them in their pots, &c. when at each time a little fresh Tan should be added to make up the deficiency arising from the settling of the beds; but this will be inconsiderable, as the leaves do not settle much after their long *Couching*. During the two first years of my practice I did not use any Tan, but plunged the Pine-pots into the leaves, and just covered the surface of the beds, when finished, with a little saw-dust, to give it a neatness. This method was attended with one inconvenience; for by the caking of the *leaves* they shrunk from the sides of the pots, whereby they became exposed to the air, and at the same time the heat of the beds was permitted to escape.

“Many powerful reasons may be given why Oak leaves (for I have not tried any other kinds) are preferable to Tanners bark.

“First, They always heat regularly; for during the whole time that I have used them, which is near seven years, I never once knew of their heating with violence; and this is so frequently the case with Tan, that I affirm, and indeed it is well known to every person conversant in the management of the Hot-house, that Pines suffer more from this one circumstance, than from all the other accidents put together, Insects excepted. When this accident happens near the time of their fruiting, the effect is soon seen in the fruit, which always comes ill shaped and exceedingly small. Sometimes there will be little or no fruit at all; therefore Gardeners who make use of Tan *only* for their Pines, should be most particularly careful to avoid an over-heat at that critical season—the time of *showing* fruit.

“ Secondly, The heat of Oak leaves is constant; whereas Tanners bark generally turns cold in a very short time after its furious heat is gone off. This obliges the Gardener to give the Tan frequent turnings in order to promote its heating. These frequent turnings (not to mention the expence) are attended with the worst consequences, for by the continual moving of the pots backwards and forwards, the Pines are exposed to the extremes of heat and cold, whereby their growth is considerably retarded; whereas when leaves are used, the Pines will have no occasion to be moved but at the times of potting, &c.—— The Pines have one particular advantage in this undisturbed situation; their roots grow through the bottoms of the pots and matt amongst the leaves in a surprizing manner. From the vigour of the plants, when in this situation, it is highly probable that the leaves, even in this state, afford them an uncommon and agreeable nourishment.

“ Thirdly, There is a saving in point of expence, which is no inconsiderable object in places where Tan cannot be had but from a great distance, as is the case here, the article of carriage amounting to ten shillings for each waggon-load. Indeed, this was the principal reason that first induced to me to make trial of leaves.

“ My last ground of preference is the consideration that decayed Leaves make good manure; whereas rotten Tan is experimentally found to be of no value. I have often tried it both on Sand and Clay, also on Wet and Dry lands, and never could discover, in any of my experiments, that it deserved the name of a Manure; whereas decayed Leaves are the richest, and, of all others, the most suitable for a Garden. But this must only be understood of leaves after they have undergone their fermentation which reduces them to a true vegetable mould, in which we experimentally know that the food of plants is contained——but whether that food be *Oil*, *Mucilage*, or *Salt*, or a combination of all three, I leave to Philosophers to determine. This black mould is, of all others, the most proper to mix with compost earth, and I use it in general for Pines, and almost for every thing that grows in pots. For Flowers it is most excellent. The remainder of this vegetable mould may be employed in manuring the quarters of the Kitchen-Garden, for which purpose it is highly useful.

“ Leaves mixed with Dung make excellent Hot-beds——and I find that beds compounded in this manner preserve their heat much longer than when made entirely with Dung. In both cases the application of Leaves will be a considerable saving of Dung, a circumstance very agreeable, as it will be the means of preventing the contests frequently observed in large families between the Superintendant of the Gardens and the Directors of the Husbandry.

Welbeck, Feb. 20, 1776.

W. SPEECHLY.”

DENDROLOGIA.

BOOK THE FOURTH.

*An Historical Account of the SACREDNESS and USE of
STANDING GROVES.*

AND thus have we finished what we esteemed necessary for the direction of planting, and the culture of trees and woods in general; whether for the raising of new, or preservation of the more antient and venerable shades, crowning the brows of lofty hills, or furnishing and adorning the more fruitful and humble plains, groves, and forests, such as were never prophaned by the inhumanity of edge-tools: Woods, whose original are as unknown as the Arcadians; like the goodly Cedars of Libanus, Psalm civ. *Arbores Dei*, according to the Hebrew, for something doubtless which they noted in the genius of those venerable plants, besides their mere bulk and stature: And, verily, I cannot think to have well acquitted myself of this useful subject, till I shall have in some sort vindicated the honour of trees and woods, by shewing my reader of what estimation they were of old for their divine, as well as civil uses; or at least refreshed both him and myself with what occurs of historical and instructive amongst the learned concerning them. And first, standing woods and forests were not only the original habitations of men, for defence and fortresses, but the first occasion of that speech, polity, and society which made them differ from beasts. This, the Architect Vitruvius * ingeniously describes, where he tells us, that the violent percussion of one tree against another, forced by an impetuous wind, setting them on fire, the flame did not so much surprize and affright the salvage foresters as the warmth, which (after a little gazing at the unusual accident) they found so comfortable: This (says he) invited them to approach it nearer, and, as it spent and consumed, by signs and barbarous tones (which in process of time were formed into significant words) to encourage one another to supply it with fresh combustibles: By this accident the wild people, who before were afraid of one

BOOK IV.

* Vitruv. l. ii.
cap. i.

Book IV. another, and dwelt asunder, began to find the benefit and sweetness of society, mutual assistance, and conversation; which they afterwards improved, by building houses with those trees, and dwelling nearer together. From these mean and imperfect beginnings they arrived in time to be authors of the most polished arts; they established laws, peopled nations, planted countries, and laid the foundation of all that order and magnificence which the succeeding ages have enjoyed. No more then let us admire the enormous moles and bridges of Caligula across to Baïæ; or that of Trajan over the Danubius (stupendous work of stone and marble!) to the adverse shores; whilst our timber and our trees making us bridges to the furthest Indies and Antipodes, land us into new worlds. In a word, (and to speak a bold and noble truth) trees and woods have twice saved the whole world; first by the Ark, then by the Cross; making full amends for the evil fruit of the tree in Paradise, by that which was borne on the tree in Golgotha. But that we may give an account of the sacred and other uses of these venerable retirements, we will next proceed to describe what those places were.

Though *Silva* was the more general name, denoting a large tract of wood or trees, the *incidua* and *cadua*, yet there were several other titles attributed to greater or lesser assemblies of them: *Domus Silvae* was a Summer-house; and such was Solomon's *בית היער*, 1 Reg. vii. 2. When they planted them for pleasure and shade only, they had their *Nemora*; and as we our Parks, for the preservation of game and particularly venison, so had they their *Saltus*, and *Silva invia*, secluded for the most part from the rest. But among authors we meet with nothing more frequent, and indeed more celebrated, than those arboreous amenities and plantations of woods, which they called *Luci*; and which, tho' sometimes restrained to certain peculiar places for devotion, (which were never to be felled) yet were they also promiscuously both used, and taken for all that the wide forest comprehends, or can signify. To dismiss a number of critics, the name *Lucus* is derived by Quintilian and others, who delight to play with words, (by antiphrasis) à *minime Lucendo*, because of its density*,

——— *nulli penetrabilis astris.*

N O T E S.

* The learned Mr. Bryant, in his Analysis of Antient Mythology, has something extremely curious upon the derivation of the word *Lucus*. He says that the Sun, by the Amonians, was stiled *El-Uc*, which the Grecians changed into *Λυκος*, *Lucos*. He was also stiled *El-Uc-Or*, which was changed to *Λυκοπερις*; and *El-Uc-Aon*, ren-

whence Apuleius used *Luco subluco*; and the Poets, *Sublustrī umbra*: BOOK IV.
 Others (on the contrary) have taken it for light in the masculine; *umbra*,
non quia minime, sed quia maxime luceat; by so many lamps suspended in
 them before the shrine; or because they kindled fires, by what accident
 unknown:

————— feu Cœli fulmine misso,
 Sive quod inter se bellum Silvestria gentes
 Hostibus intulerant ignem, formidinis ergo.

EUCLRET. lib. v.

————— Whether it were
 By lightning sent from Heaven, or else there
 The salvage men in mutual wars and fight,
 Had set the trees on fire, their foes t' affright.

Or whether the trees set on fire themselves:

Mutua dum inter se rami stirpesque teruntur.
 When clashing boughs thwarting, each other fret.

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dered Lycaon, Λυκαων. As this personage was the same as El-Ūc, Λυκος; it was fabled
 of him that he was turned into a wolf. The cause of this absurd notion arose from
 hence: every sacred animal in Egypt was distinguished by some title of the Deity.
 But the Greeks never considered whether the term was to be taken in its primary, or
 in its secondary acceptation; hence they referred the history to an animal, when it
 related to the God, from whom the animal was denominated. Λυκος, Lucos, was, as
 I have shewn, the name of the Sun; hence, wherever this term occurs in composition,
 there will be commonly found some reference to that Deity, or to his substitute Apollo.
 We read of Λυκος Απωλλωνος υιος: of *Lycorus*, a supposed son of Apollo: of *Lycomedes*,
 another son: of *Lycosura*, the first city which the sun beheld. The people of Delphi
 were of old called *Lycorians*; and the summit of Parnassus, *Lycorea*. Near it was a
 town of the same name; and both were sacred to the God of Light. From *Lucos*, in
 in this sense, came lux, luceo, lucidus, and Jupiter Lucetius, of the Latins: and
 Λυκος, Λυχνια, Λυχνηω, of the Greeks: also Λυκαβας, and αμφιλυκος, though differently
 expressed. Hence it was that many places, sacred to Apollo, were stiled *Leuce*, *Leuca*,
 Λευια, *Leucas*, *Leucate*:

Mox et Leucatæ nimboſa cacumina montis.

Et formidatus nautis aperitur Apollo.

VIRG.

Hence also inscriptions DEO LEUCANIÆ: which term seems to denote SOL-FONS,
 the Fountain of Day. The name *Lycophron*, Λυκοφρων, which some would derive from
 Λυκος, a Wolf, signifies a person of an enlightened mind. Groves were held very
 sacred: hence *Lucus*, which some would absurdly derive a *non lucendo*, was so named
 from the Deity there worshiped. Vol. I. p. 79.

BOOK IV.

For such accidents, and even the very heat of the sun alone has kindled wonderful conflagrations; or haply (and more probably) to consume their sacrifices, we will not much insist. The Poets, it seems, speaking of Juno, would give it quite another original, and tune it to their songs invoking Lucina, whilst the main and principal difference consisted not so much in the *Name*, as the *Use* and *Dedication*, which was for silent, awful, and more solemn Religion (*Silva*, *quasi silens locus*); to which purpose they were chiefly *manu confiti*, such as we have been treating, entire, and never violated with the Ax: Fabius calls them *Sacros ex Vetustate*, venerable for their age; and certain it is, they had of very great antiquity been consecrated to holy uses, not only by superstitious persons to the Gentile Deities and Heroes, but to the true God by the Patriarchs themselves, who, *ab initio*, (as is presumed) did frequently retire to such places to serve him, compose their meditations, and celebrate sacred mysteries, prayers, and oblations; following the tradition of the Gomerites, or descendants of Noah, who first peopled Galatia and other parts of the world after the universal deluge*. From hence some presume that even the antient Druids had their origin: But that Abraham might imitate what the most illustrious of that age had practised before him, may not be unlikely; for we read he soon planted himself and family at the Quercetum of Mamre, Gen. xiii. where, as Eusebius, Eccles. Hist. l. i. c. 18. † gives us the account, he spread his pavilions, erected an altar, offered and performed all the priestly rites; and there, to the immortal glory of the Oak, or rather *Arboreous Temple*, he entertained God himself. Isidore, St. Hierom ‡, and Sozomen report confidently, that one of the most eminent of those trees remained till the reign of the great Constantine, (and the stump till St. Hierom) who founded a venerable chapel ¶ under it; and that both the Christians, Jews, and Arabs held a solemn anniversary or station there, and believed that from the very time of Noah it had been a consecrated place. Sure we are, it was about some such assembly of trees, that God was pleased first of all to appear to the Father of the Faithful, when he established the Covenant with him; and more expressly, when removing thence (upon confirming the League with Abimelech, Gen. xxi. and settling at Beerseba) he designed an express place for God's Divine Service: For *there*, says the sacred text, *he planted a Grove, and called upon the name of the Lord*. Such another tuft we read of, (for we must not always restrain it to one single tree) when the Patriarch came to אֵלֶן מוֹרֵב, *Elan Moreb*, *ad Quercetum Moreb*: But whether that were the same in which the High-Priest deposited the famous Stone, after the exhortation mentioned, Joshua xxiv. 26,

* See the learned Pezron Antiqu. fuse.

† Euseb. l. v. cap. 19. Demonstr. Evang. ubi de Terebintho. Hieronymus, de locis Hebraicis, &c. ‡ Hieron in Epitaph Paul. vide & Eras. Schol. in Ep. ad Pammachium. ¶ See the Emperor's Rescript to Bish. Macarius, for the demolition of the Idol worshipped there; and the building of a magnificent church. Euseb. de vit. Constant. l. iii. cap. 50.

we do not contend; *under an Oak*, says the Scripture, and it grew near the Sanctuary, and probably might be that which his grandchild consecrated with the funeral of his beloved Rebecca, Gen. xxxv. For it is apparent, by the context, that *there* God appeared to him again: So Grotius, upon the words, “*subter Quercum*,” says, *Illam ipsam cujus mentio*, Gen. xxxv. 4. *in historia Jacobi et Jude*; and adds, *Is locus in honorem Jacobi diu pro Templo fuit*: “that the very spot was long after used for a Temple in honour of him.” This was the place which *Sozomen* calls *Terebintum*, from certain trees growing there; these, says *Josephus*, *de Bell. Jud.* l. v. were as antient as the world itself. Some report that this Oak sprung from a staff, which one of the Angels, who appeared to the Patriarch, fixed in the ground: So *Geor. Syncellus* in *Chronico*. *Mirum verò est* (says *Valesius* on this passage of *Eusebius*) *cum Quercus ibidem fuerit, sub qua Abraham Tabernaculum posuerit, (ut legitur in Gen. xviii.) cur locus ipse à Terebinto potius quam a Quercu nomen acceperit*. In the mean time, as to the prohibition, Deut. xvi. 21, whether this Patriarchal Devotion in Groves, and under Arboreous Shades, was approved by God, till there was a fixed altar, and his ceremonial worship confined to the tabernacle and temple, I think needs be no question*.

* D. Doughty
Analecta Sacra
Excurf. xiii.

If we therefore now would tract the religious esteem of trees and woods yet farther in holy writ, we have that glorious vision of Moses in the fiery thicket; and it is not to abuse or violate the text, that *Moncaus* and others interpret it to have been an entire Grove, and not a single bush only which he saw as burning, yet unconsumed. *Puto ego* (says my Author) *rubri vocabulo non quidem rubum aliquem unicum & solitarium significari, verum rubetum totum, aut potius fruticetum, quomodo de Quercu Mambre pro Querceto toto docti intelligunt*. Now that they worshipped in that place soon after their coming out of Egypt, the following story shews; and the feast of tabernacles had some resemblance of patriarchal devotion under trees†, though but in temporary Groves and shades in manner of booths, yet celebrated with all the refreshings of the forest; and from the very infancy of the world, in which Adam was entertained in paradise, and Abraham (as we noted) received his divine guests, not in his tent, but under a tree, an Oak, (*triclinium angelicum*, the angels’ dining-room) all intelligent persons have embraced the solace of shady arbours, and all devout persons found how naturally they dispose our spirits to religious contemplations. For this, as some conceive, they much affected to plant their trees in circles, and gave that capacious form to the first temples, obser-

† Lev. xxxii.
40.

BOOK IV. ved not only of old, but even at this day by the Jews, as the most accommodate for their assemblies; or, as others, because that figure most resembled the universe and the heavens: *Templum à templando*, says a knowing critic; and another, *Templum est nescio quid immane, atque amplum*; such as Arnobius speaks of, that had no roof but heaven, till that sumptuous fabric of Solomon was confined to Jerusalem, and the goodliest Cedars and most costly woods were carried thither to form the columns and lay the rafters; and then, and not till then, was it so much as schism, that I can find, to retire to Groves for their devotion, or even to Beth-el itself.

See Tirinus,
our Mede,
Ainsworth.
Diatrib. on
Josh. xxiv. 26.
Valesius An-
not. in lib. 2.
Hist. Eccles.
Euseb. p. 28.

In such recesses were the antient Oratories and *Proseuchæ*, built theatre-wise, *sub dio*, at some distance from the cities, Acts xvi. and made use of even amongst the Gentiles as well as the people of God; (nor is it always the less authentical for having been the guise of nations); hence that of Philo, speaking of one who *πάσας Ἰουδαίων προσευχὰς ἰδενδρόφυοντι*, &c. had felled all the trees about it; and such a place the Satyrist means where he asks, *In qua te quero Proseucha?* because it was the rendezvous also where poor people used to frequent, to beg the alms of devout and charitable persons; so as it was esteemed *piacular* for any to cut down so much as a stick about them, unless it were to build them; when, with the Psalmist, men had honour according to their forwardness of repairing the houses of God in the land; upon which account it was lawful to lift up *axes* against the goodliest trees in the forest. But those zealous days are past:

Et nunc desertis cessant sacraria lucis:

Aurum omnes, victa jam pietate, colunt.

PROPERT.

Now temples shut, and groves deserted lie:

All gold adore, and neglect piety.

In the mean time, that which came nearest to the *Scenopegia* of the Jews, and other solemnities, was called by the Romans, *Umbrae*; as those in *Neptunalibus* are described by the poet:

Plebs venit, ac virides passim disjecta per herbas

Potat & accumbit cum pare quisque sua:

Sub jove pars durat, pauci tentoria ponunt;

Sunt quibus è ramis frondea facta casu est. OVID. Fast. lib. iii.

All forts together flock; and, on the ground
 Display'd, each fellow with his mate drinks round.
 Some sit in open air, some build their tents,
 And some themselves in branchy arbors fence.

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Plutarch, speaking of the anniversary feast of Bacchus, plainly resembles it to that of the tabernacles, carrying about *Θύραξ Φοινικῶν*, branches of Palm, Citron, and other trees, as Josephus describes the Jewish Festival: The custom (for ought I know) is still kept up in many places of our country, and abroad, on May-Day (and about the time of the year) when the young men and maidens, like the Pagan *Σύστροφιαι*, go out into the woods and coppices, cut down and spoil young springers, to dress up their May-booth, and dance about the *Pole*, as in pictures we see the wanton Israelites about the *Molten Calf*. For thus, as we noted, those rites commanded by God came to be prophaned, and the retiredness of Groves and shades for their opacousness, abused to abominable purposes, and works of darkness. But what good or indifferent thing has not been subject to perversion? It is said in the end of Isaiah, *Exprobat̃ur Hebræis quod in Opisthonaïs idolorum hortu essent in quorum medio februebantur*; but how this is applicable to Groves, does not appear so fully; though we find them interdicted, Deut. xvi. 21. Judg. vi. 26. 2 Chron. xxxi. 3, and forbidden to be planted near the temple. And an impure Grove on mount Libanus, dedicated to Venus, was by an imperial edict of Constantine extirpated: But from the abuse of the thing to the non-use, the consequence is not always valid; and we may note as to this very particular, that where in divers places of holy writ the denunciation against Groves is so express, it is frequently to be taken but *catachrestically*, from the *Wooden Image* or *Statue* called by that name, as our learned Selden makes out by sundry instances in his *Syntagma de Diis Syris*. Indeed the use of Groves upon account of devotion was so antient, and seemed so universal, that they consecrated not only real and natural Groves, but *Lucus pictos*, artificial *Boscage* and representations of them.

Vid. Seldenum
 de jure Nat. &
 Gent. Heb.
 lib. ii. cap. vi.
 Lil. & Gre.
 Gyraldum de
 diis gent. Syn-
 tag. 17.

Vid. Sancti-
 Pifcat. Groti-
 um.

The sum of all is, Paradise itself was but a kind of Nemorous Temple, or Sacred Grove, planted by God himself, and given to man, *tanquam primo sacerdoti*; the word is עֵבֶר *, which properly signifies to serve or administer *res divinas*; a place consecrated for sober discipline, and to contemplate those mysterious and sacramental trees, which they were not to touch with

* Gen. ii. 15.

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their hands; and in memory of them, I am inclined to believe, holy men (as we have shewed in Abraham and others) might plant and cultivate Groves, where they traditionally invoked the Deity; and St. Hierom, Chrysostom, Cyprian, Augustin, and other Fathers of the church, greatly magnified these pious advantages; and Cajetan tells us, that from Isaac to Jacob, and their descendants, they followed Abraham in this custom. Solomon was a greater Planter of them, and had an house of pleasure, or lodge, in one of them for recess. In such places were the monuments of their saints, and the bones of their heroes deposited; for which David celebrated the humanity of the Galadites, in *Nemora Jabes*, as most sacred and inviolable. In such a place did the Angel appear to Gideon; and in others, Princes were *inaugurated*; so Abimelech, Judg. ix. And the Rabbins add a reason why they were reputed so venerable; because, being more remote from men and company, they were more apt to compose the soul, and fit it for divine actions*.

Though, since the Devil's intrusion into Paradise, even the most holy and devoted places were not free from his temptations and ugly stratagems, yet we find our blessed Saviour did frequently retire into the wilderness, as Elijah and St. John Baptist did before him, and divers other holy men, particularly the *Θεωρητικοί*, whom Philo mentions, a certain religious sect, who, addicting themselves to contemplation, chose the solitary recesses of Groves and Woods; as of old the Rechabites, Essenes, primitive Monks, (and other institutions) retired amongst the Thebaid desarts; and perhaps the air of such retired places may be assistant and influential for the inciting of penitential expressions and affections, especially where one may have the

Philo lib. πηγ.
Sic Greg.

NOTES.

* It is natural for man to feel an awful and religious terror when placed in the centre of a thick wood; on which account, in all ages, such places have been chosen for the celebration of religious ceremonies. "Lucos et ipsa silentia adoramus." Seneca says, *Si tibi occurris vetustis arboribus, et solitam altitudinem egressis frequens lucus, et conspectum Caeli densitate ramorum aliorum alios protegentium submovens: illa praeeritas Sylvarum, et secretum loci et admiratio umbræ, in aperto tam densæ atque continuæ, fidem tibi numinis facit.* Epist. xli.

All pale with sacred horror, they survey'd
The solemn mountain and the reverend shade.
Some God, the Monarch said, some latent God
Dwells in that gloom, and haunts the frowning wood.

PITT'S VIRGIL.

additional assistances of solitary grotts, murmuring streams, and desolate prospects. I remember that under a tree was the place of that admirable St. Augustin's solemn conversion, after all his importunate reluctances. I have often thought of it, and it is a melting passage, as himself has recorded it, *Con. l. viii. c. 8.* and he gives the reason, *Solitudo enim mihi ad negotium flendi aptior suggereretur.* And that indeed such opportunities were successful for recollection, and to the very reformation of some ingenuous spirits, from secular engagements to excellent and mortifying purposes, we may find in that wonderful relation of Pontianus's two friends, great Courtiers of the time, as the same holy father relates it, previous to his own conversion. And here I cannot omit an observation of the learned Dr. Plot, in his (often-cited) *Nat. Hist. of Oxfordshire*, taking notice of two eminent religious houses, whose foundations were occasioned by trees; the first Osney-Abbey; the second, by reason of a certain tree, standing in the meadows, (where after was built the Abbey) to which a company of Pyes were wont to repair as oft as Editha, the wife of Robert D'Oyly, came to walk that way to solace herself; for the clamorous birds did so affect her, that, consulting with one Radulphus (Canon of St. Fridiswid) what it might signify, the subtle man advised her to build a Monastery where that tree stood, as if so directed by the Pyes in a miraculous manner; nor was it long ere the Lady procured her Husband to do it, and to make Radulphus (her Confessor) first Prior of it.

Such another foundation was caused by a triple Elm having three trunks issuing from one root. Near such a tree as this was Sir Thomas White, Lord Mayor of London, warned by a dream to erect a College for the education of youth, which he did, namely, St. John's in Oxford, which, with the very tree, still flourishes in that University. But of these enough, and perhaps too much.

We shall now, in the next place, endeavour to shew how this innocent veneration to Groves passed from the people of God to the Gentiles, and by what degrees it degenerated into dangerous superstitions; for the devil was always God's ape, and did so ply his Groves, Altars, and Sacrifices, and almost all other rites belonging to his worship, that every green tree was full of his abominations, and numerous places were devoted to his impure service: *Hi fuere* (says Pliny, speaking of Groves) *quondam Numinum templa*, &c. "These were of old the temples of the gods; and

Cyrl. Alexan.
in Hof. iv. 13.
Deut. xvi. 4.
2 Reg. xvi. 4.

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Melchior
Adamus Hist
Eecl. de Sue-
conibus, cap.
ccxxxiv.

Mariana in
2. Paralip.
xxviii. 4.

“(after that simple, but antient custom) men at this day consecrate the fairest and goodliest trees to some deity or other; nor do we more adore our glittering shrines of gold and ivory than the Groves in which, with a profound and awful silence, we worship them.” Quintilian, speaking of the veneration paid an old umbrageous Oak, adds, *In quibus grandia, & antiqua robora jam non tantum habent speciem, quantum religionem*: For in truth the very tree itself was sometimes deified, and that Celtic statue of Jupiter no better than a prodigious tall Oak, whence, it is said, the Chaldean Theologues derived their superstition towards it; and the Persians, we read, used that tree in all their mysterious rites. And, as for wood in general, they paid it that veneration for its maintaining their deity, (represented by their perennial fire) that they would not suffer any sort of wood to be used for coffins to inclose the dead in, (but wrapt them in plates of iron) counting it a profanation. In short, so much were people given up to this devilish and unnatural blindness, as to offer human sacrifices, not to the *Tree-gods* only, but to the *Trees* themselves as real Gods:

Omnisque humanis lustrata cruoribus arbos.

LUCAN.

Each tree besprinkled us with human gore.

Procopius tells us plainly, that the Slavii worshipped trees and whole forests of them: See Jo. Dubravius, lib. i. Hist. Bohem. And that formerly the Gaudenses did the like, Surius, the Legendary, reports in the life of St. Amadus; so did the Vandals, says Albert Crantz; and even those of Peru, as I learn from Acosta, lib. v. cap. xi. But one of the first idols which procured particular veneration in them, was the Sidonian Ashteroth, who took her name à *lucis*, as the Jupiter *ivdivda* amongst the Rhodians, the Nemorensis Diana or Arduenna, a celebrated Deity of this our island, for her patronage of wood and game;

Divapotens memorum, terror silvestribus Apris:

as Gildas, an antient bard of ours, has it; so soon had men, it seems, degenerated into this irrational and stupid devotion—that Arch *Fanatic* Satan, who began his pranks in a tree, debauching the contemplative use of Groves and other solitudes. Nor were the Heathens alone in this crime, the Basilidians, and other Hereticks even amongst the Christians, did con-

fecrate to the woods and the trees their serpent-footed and barbarous ΑΒΡΑΕΑΣ, as it is yet to be seen in some of their mysterious Talismans and Peripatas which they carried about.

But the Roman madness (like that which the Prophet derides in the Jews) was well perstringed by Sedulius and others, for imploring these stocks to be propitious to them, as we learn in Cato de R. R. c. 113. 134. Nor was it long after (when they were generally consecrated by Faunus) that they boldly set up his oracles and responses in these nemorous places: Hence the Heathen Chapels had the name of *Fana*, and, from their wild and extravagant religion, the professors of it *Fanatics*; a name well becoming some of the late *Enthusiasts* amongst us, who, when their quaking fits possess them, resemble the giddy motion of trees, whose heads are agitated with every wind of *Doctrine*.

Here we may not omit what learned men have observed concerning the custom of Prophets, and persons inspired of old, to sleep upon the boughs and branches of trees; I do not mean on the tops of them, (as the Salvages somewhere do in the Indies, for fear of wild beasts in the night-time) but on mattresses and beds made of their leaves, *ad consulendum*, to ask advice of God. Naturalists tell us, that the Laurus and Agnus Castus were trees which greatly composed the fancy, and did facilitate true visions; and that the first was specifically efficacious *πρὸς τὰς ἐνθουσιασμούς*, (as my Author expresses it) to inspire a poetical fury: Such a tradition there goes of Rebekah the wife of Isaac, in imitation of her father-in-law: The instance is recited out of an antient Ecclesiastical History by *Abulensis*: and from hence the Delphic Tripods, the Dodonæan Oracle in Epirus, and others of that nature, had their originals: At this decubation upon boughs the Satyrist seems to hint, where he introduces the Gypsies:

See S. Fulgent. Mythol. cap. xiii. & Munsterum in Comment.

See Hier. in Trad. Heb. 3 Reg. c. iv.

Arcanam Judæa tremens mendicat in aurem
Interpres legum Solymarum, & magna Sacerdos
Arboris, ac summi fida internuncia cœli. Juv. Sat. vi.

With fear

A cheating Jewess whispers in her ear,
And begs an alms: An High-Priest's daughter she,
Vers'd in their Talmud and Divinity;
And prophecies beneath a shady tree.

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For indeed the Delphic Oracle (as Diodorus, lib. xvi. tells us) was first made *è Lauri ramis*, of the branches of Laurel transferred from Theffaly, bended and arched over in form of a bower or summer-house; a very simple fabrick you may be sure: And Cardan, I remember, in his book de Fato, insists very much on the dreams of trees for portents and presages, and that the use of some of them do dispose men to visions.

Vide Annium
Viterb. lib.
xvii. fol. 158.
* Cic. de Leg.
lib. ii.

* See Aristo-
phanes Schol.
ad Pluti Ver-
ba: καὶ ταῦτα
πρὸς τὸ μίτω-
πον, &c.

— ἔτι ἐπὶ
τῶν κοτινῶν, καὶ
ἄλλων δένδρων
πανταχρὶ ἐν
τοῖς ἱεροῖς πρε-
σβυτέρων
τὰ ἀναθήματα.
To which add,
Apul. Miles.
VI. Videt do-
na speciosa, &
lacinias auro
literatas, ra-
mis arborum
positibusque
suffixas.

From hence then began Temples to be erected and sought to in such places; nay, we find * sanction for it among the laws of the Twelve Tables; and as there was hardly a Grove without its Temple, so almost every Temple had a Grove belonging to it, where they placed idols, altars, and lights, endowed with fair revenues, which the devotion of superstitious persons continually augmented: Such were those * *arbores obumbratrices*, mentioned by Tertullian, Apol. cap. ix. on which they suspended their *Ἀναθήματα* and devoted things: And I remember to have seen something very like this in Italy, and other parts; namely, where the images of the Blessed Virgin, and other saints, have been enshrined in hollow and umbrageous trees, frequented with much veneration; which puts me in mind of what that great traveller Pietro della Valla relates, where, speaking of an extraordinary Cypress, yet extant, near the tomb of Cyrus, to which at this day many pilgrimages are made, he mentions a gummy transudation which it yields, that the Turks affirm to turn every Friday into drops of blood: The tree is hollow within, adorned with many lamps, and fitted for an Oratory; and indeed some would derive the name *Lucus*, a Grove, as more particularly to signify such enormous and cavernous trees, *quod ibi lumina accenderentur religionis causa*: But our Author adds, The *Ethnics* do still repute all great trees to be *divine*, and the habitation of *souls* departed: These the Persians call *Pir* and *Imàm*. Perhaps such a hollow tree was that *Asylum* of our Poet's Hero, when he fled from his burning Troy:

—————juxtaq; antiqua Cupressus
Religione Patrum multos servata per annos. ÆN. ii.

—————an ancient Cypress near,
Kept by religious parents many a year.

For that they were places of protection, and privileged like churches and altars, appears out of Livy, and other good authority: Thus where they introduce Romulus encouraging his new colony,

— Ut saxo Lucum circumdedit alto
Quilibet, huc dicit, confuge, tutus eris.

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So soon as e'er the Grove he had immur'd,
Haste hither, says he, here you are secur'd.

Such a sanctuary was the *Aricina*, and Suburban *Diana*, called the *Nemorale Templum*, and divers more which we shall reckon up anon. Lucian in his *Dea Syria*, speaks of these temples and dedications in their Groves among the Egyptians: *Lucus in urbe fuit*, &c. and what follows? *Hic Templum*—and since they could not translate the Grove with the idol, they * carved out something like it, which the superstitious people bought, carried home, and made use of, representing those venerable places, in which they had the images of some feigned Deity (suppose it Tellus, Baal, or Priapus); and such was the Jupiter *ἑνδεδωτος* of the Rhodians, Bacchus of the Boetians, *עשתרות* the Sidonian Ashteroth: and the women mentioned 2 Reg. xxiii. 7, who are said to weave hangings and curtains for the Grove, were no other than makers of Tentories to spread from tree to tree, for the more opportune and secret perpetration of those impure rites and mysteries, which (without these coverings) even the opacousness of the places were not obscure enough to conceal *.

Virg. Eclog. 6.
& Æneid. 1.
Vide Fab. l. 3.
Sennett. c. 1.

* Luci dicuntur, non modo collectio arborum, &c. sed etiam sciagraphæ five delineationes lucorum in tabella: See the Annotation on Isa. xvii. collated with 2 Reg. xxiii. 6. Crit. Sac. for they brought the Grove out of the temple, and burnt it; which clearly shews it was the picture or image of the Grove, and not the trees themselves.
† Canc. lib. i. cap. 42. Selden Jani Angl. fac. cap. 2.

The famous Druids, or Saronides †, whom the learned Bochart, from Diodorus, proves to be the same, derived their Oak-theology, namely, from that spreading and gloomy-shading tree, probably the Grove at Mambre, Gen. xiii. 2. How their mysteries were celebrated in their woods and forests, is at large to be found in Cæsar, Pliny, Strabo, Diodorus, Mela, Apuleius, Ammianus, Lucan, Aventinus, and innumerable other writers; where you will see that they chose the Woods and the Groves, not only for all their religious exercises, but their courts of justice, as the whole institution and discipline is recorded by Cæsar, lib. vi. and as he, it seems, found it in our country of Britain, from whence it was afterwards translated into Gallia; for he attributes the first rise of it to this

NOTES.

* For proof of the lewdness and obscenity of many of the religious rites of the Heathen, vid. Herodot. Euterp. cap. lxiv. Diodor Sicul. lib. iv. Valer Maxim. lib. ii. cap. vi. Juvenal, Sat. ix. ver. 24, and what Eusebius saith of a Grove on mount Libanus, dedicated to Venus, in his Life of Constantine, lib. iii. cap. lv. Compare 1 Kings xiv. 23, 24.

BOOK IV. once happy island of Groves and Oaks; and affirms, that the antient Gauls travelled hither for their initiation. To this Tacitus assents, 14 Annal. and our most learned critics vindicate it, both from the Greeks and French impertinently challenging it: But the very name itself, which is purely Celtic, does best decide the controversy: For though Δρῦς be *Quercus*, yet Vossius skilfully proves that the Druids were altogether strangers to the Greeks; but what comes yet nearer to us, *Dru*, *fides* (as one observes) begetting our now antiquated *Trou* or *True*, makes our title the stronger: Add to this, that amongst the Germans it signified no less than God himself; and we find *Drutin* or *Trudin* to import *Drvine*, or *Faithful*, in the *Othfridian Gospel*, both of them *Sacerdotal* expressions. But that in this island of ours, men should be so extremely devoted to trees, and especially to the Oak, the strength and defence of all our enjoyments, invironed as we are by the seas, and martial neighbours, is less to be wondered.

Non igitur Dryadæ nostrates pectore vano
 Nec sine consulto coluerunt Numine Quercum;
 Non illam Albionis jam tum celebravit honore
 Stulta superstitio, venturive infæcia sæcli
 Angliaci ingentes puto prævidisse triumphos
 Roboris, imperiumque maris, quod maximus olim
 CAROLIDES vastâ Victor ditione tenebat.

COULEI lib. vi. PL

Our British Druids, not with vain intent,
 Or without Providence, did the Oak frequent;
 That Albion did that Tree so much advance
 Nor superstition was, nor ignorance.
 Those Priests divining even then, bespoke
 The mighty triumphs of the Royal Oak:
 When the sea's empire with like boundless fame,
 Victorious CHARLES, the son of CHARLES, shall claim.

as we may find the prediction gloriously followed by our ingenious Poet, where his Dryad consigns that sacred Depositum to this Monarch of the Forest, the Oak, than which nothing can be more sublime and rapturous; whilst we must never forget that wonderful Providence which saved this

forlorn and persecuted Prince, after his defeat at Worcester, under the Book IV.
 shelter of this auspicious and hospitable tree alone; when

———— All the countries fill'd
 With enemies troops in every house and Grove;
 His sacred head is at a value held,
 They seek, and near, now very near they move.

What should they do? They from the danger take
 Rash, hasty counsel; yet, from heav'n inspir'd,
 A spacious Oak he did his Palace make,
 And safely in its hollow womb retir'd.

The loyal Tree its willing boughs inclin'd,
 Well to receive the climbing Royal Guest,
 (In Trees more pity than in Men we find)
 And its thick leaves into an harbour press'd.

A rugged Seat of Wood became a Throne,
 Th' obsequious Boughs his Canopy of State:
 With bowing Tops the Tree their King did own,
 And silently ador'd him as he fate.

But to return to the superstitions we were speaking of. They were utterly abolished under the reign of Claudius, as appears by Suetonius; and yet, by Tacitus, they continued here in Britain till Nero; and in Gaul till Vitellius, as is found by St. Gregory writing to Q. Bruneant, about the prohibiting the Sacrifices and Worship which they paid to Trees, which, Sir James Ware affirms, continued in Ireland till Christianity came in.

From these Silvan Philosophers and Divines (not to speak much of the Indian Brachmans, or ancient Gymnosophists) it is believed that the great Pythagoras might institute his silent Monastery; and we read that Plato entertained his Auditors amongst his Walks of Trees, which were afterward defaced by the inhumanity of Sylla; when, as Appian tells us, he cut down those venerable shades to build forts against Pyrræus. Another we find he had planted near Anicerides with his own hands, wherein grew that celebrated Platanus, under which he introduces his master Socrates discoursing

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with Phædon de Pulchro. Such another place was the Athenian Cephissia, as A. Gellius describes it. We have already mentioned the stately Xysta, with their shades, in book ii. c. iv. Democritus also taught in a Grove, as we find in that of Hippocrates to Damagetus, where there is a particular tree designed *ad otium literarum*; and I remember Tertullian calls these places *Studia opaca*. Under such shades and walks was at first the famous ACADEMIA, so venerable, as it was esteemed by the old Philosophers prophane so much as to laugh in it. See Laertius, Ælian, &c. I could here tell you of Palæmon, Timon, Apollonius, Theophrastus, and many more that erected their schools in such Colleges of Trees, but I spare my reader; I shall only note, that it is reported of Thucydides that he compiled his noble History in the Scaplan Groves, as Pliny writes; and in that matchless piece *de Oratore*, we shall find the Interlocutors to be often under the Platanus in his Tusculan Villa, where, invited by the freshness and sweetness of the place, *Admonuit* (says one of them) *me hæc tua Platanus quæ non minus ad opacandum hunc locum patulis est diffusa ramis, quam illa, cujus umbram secutus est Socrates, quæ mihi videtur non tam ipsa aquila, quæ describitur, quàm Platonis oratione crevisse, &c.* as the Orator brings it in, in the person of one of that meeting.

* See this most elegantly discussed in a Greek Epistle of Budæus to his brother.

I confess Quintilian seems much to question whether such places do not rather perturb and distract from an Orator's * recollection and the depths of contemplation: *Non tamen* (says he) *protinus audiendi, qui credunt aptissima in hoc nemora, silvasque, quod illa cæli libertas, locorumque amenitas, sublimem animum, & beatiorum spiritum parent: Mihi certè jucundus hic magis, quam studiorum hortator videtur esse secessus: Namq; illa ipsa quæ delectant, necesse est avocent ab intentione operis destinati: He proceeds—Quare Silvarum amenitas, & præter labentia flumina, & inspirantes ramis arborum auræ, volucrumque cantus & ipsa latè circumspiciendi libertas, ad se trahunt; ut mihi remittere potius voluptas ista videatur cogitationem, quam intendere.* But this is only his singular suffrage, which, as conscious of his error, we soon hear him retract, when he is by and by as loud in their praises, as the places in the world the best fitted for the diviner rhetoric of Poetry: But let us admit another † to cast in his symbol for Groves: *Nemora* (says he) *& luci, & secretum ipsum, tantam mihi afferunt voluptatem, ut inter præcipuos carminum fructus numerem, quod nec in strepitu, nec sedente ante ostium litigatore, nec inter sordes & lacrymas reorum componuntur: Sed secedit animus in loca pura, atque innocentia, fruiturque sedibus sacris.*

† Tacitus.

Whether this were the effect of the incomparable younger Pliny's Epistle to this noble Historian, I know not; but to shew him, by his own example, how study and forest-sport may consist together, he tells him how little the noise of the *Chafers* and bawling *Dogs* disturbed him, when at any time he indulged himself that healthful diversion: So far was he from being idle, and losing time, that beside his *Javelin* and *Hunting-Pole*, he never omitted to carry his *Style* and *Table-Book* with him, that upon any intermission, whilst he now and then sat by the toil and nets, he might be ready to note down any noble thought, which might otherwise escape him: The very motions (says he) and agitation of the body in the wood and solitude, *magna cogitationis incitamenta sunt*: I know, my friend (continues he) you will smile at it, however take my counsel; be sure never to carry your Bottle and Bisque into the field, without your Style and Tablet; you will find as well Minerva as Diana in the woods and mountains.

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Plin. Ep. vi.
lib. 1. Corne-
lio Tacito.

And indeed the Poets thought of no other heaven upon earth, or elsewhere; for when Anchises was setting forth the felicity of the other life to his son, the most lively description he could make of it was to tell him,

—————Lucis habitamus opacis.

—————We dwell in shady Groves.

And when Æneas had travelled far to find those happy abodes,

Devenere locos lætos, & amœna vireta
Fortunatorum nemorum, sedesque beatas.

They came to Groves, of happy souls the rest,
To Evergreens, the dwellings of the blest.

Such a prospect has Virgil given us of his Elysium; and therefore wise and great persons had always these sweet opportunities of recess, their *Domos Silvae*, as we read, 2 Reg. vii. 2, which were thence called Houses of Royal Refreshment; or, as the Septuagint, Οἶκος δρυμῶν, not much unlike the Lodges in divers of our Noblemen's Parks and Forest-walks; which minds me of his choice in another Poem:

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———— Pallas quas condidit arces,
 Ipsa colat, nobis placeant ante omnia Silvæ. ECLOG. II.

In lofty towers let Pallas take her rest,
 Whilst shady Groves, 'bove all things please us best.

And for the same reason Mæcenas

Maluit umbrosam Quercum —————

———— Chose the broad Oak ————

And as Horace bespeaks them,

———— Me gelidum nemus
 Nympharumq; leves cum Satyris Chori,
 Secernunt populo ————

Me the cool woods above the rest advance,
 Where the rough Satyrs with the light Nymphs dance.

And Virgil again,

Nostra nec erubuit Silvas habitare Thalia.

Our sweet Thalia loves, nor does she scorn
 To hunt umbrageous Groves —————

Or as thus expressed by Petrarch,

Silva placet Musis, urbs est inimica Poetis.

———— The Muse herself enjoys
 Best in the woods; Verse flies the city noise.

So true is that of yet as noble a Poet of our own;

As well might Corn as Verse in cities grow:
 In vain the thankless glebe we plow and sow:
 Against th' unnatural soil in vain we strive:
 'Tis not a ground in which these plants will thrive. COWLEY.

When it seems they will bear nothing but Nettles and Thorns of Satire, and, as Juvenal says, by *Indignation* too; and therefore almost all the Poets, except those who were not able to eat bread without the bounty of great men; that is, without what they could get by flattering them, (which was Homer and Pindar's case) have not only withdrawn themselves from the vices and vanities of the great world, into the innocent felicities of Gardens and Groves, and Retiredness, but have also commended and adorned nothing so much in their never-dying Poems*. Here then is the true Parnassus, Castalia, and the Muses; and at every call in a Grove of venerable Oaks, methinks I hear the answer of an hundred old Druids, and the Bards of our inspired ancestors.

* Juvenal Sat.
Perf. Sat.

In a word, so charmed were Poets with those natural shades, especially that of the Platanus, that they honoured temples with the names of Groves†, though they had not a tree about them. Nay, sometimes one stately tree alone was so revered: And of such a one there is mention in a fragment of an inscription in a garden at Rome, where there was a temple built under a spreading Beech tree, sacred to Jupiter, under the name of *Fagualis*.

† Ἄλση κα-
λέντες τὰ ἱερὰ
πάντα, καὶ ἡ
ψῆλα, ἐν ποιν-
ταὶ κοσμήσειν
Strab. lib. ix.

Innumerable are the testimonies I might produce in behalf of Groves and Woods out of the Poets, Virgil, Grattus, Ovid, Horace, Claudian, Statius, Silius, and others of later times, especially the divine Petrarch, (for *scriptorum chorus omnis amat nemus*) were I minded to swell this charming subject beyond the limits of a chapter. I think only to take notice, that theatrical representations, such as were those of the Iónian, called Andria; the scenes of pastorals, and the like innocent rural entertainments, were of old adorned and trimmed up *è ramis & frondibus, cum racemis & corymbis*, and frequently represented in Groves, as the learned Scaliger shews. Here the most beloved and coy mistress of Apollo rooted; and, in the walks and shades of trees*, the noblest raptures have been conceived, and poets have composed verses which have animated men to heroic and glorious actions: Here Orators (as we shewed) have made their panegyricks, Historians grave relations, and the profound Philosophers have loved here to pass their lives in repose and contemplation; and the frugal repasts—*mollesque sub arbore somni*, were the natural and chaste delights of our forefathers, so sweetly described by Papinius:

Poetices, lib. i.
cap. 21.

* See Wower.
de Umbra,
cap. xxvi. Bis-
ciola Horæ
subciff. cap. 9.

Subter opaca quies vacuusque silentia servat
Horror, & exclusæ pallet mala lucis imago

BOOK IV.

Nec caret umbra Deo
 Arboribus suis horror inest, quin ipse sacerdos
 Accessus, Dominumque timet deprehendere luci.

Nor were the Groves thus frequented by the great Scholars and the great Wits only, but by the greatest Statesmen and Politicians also. Thence that of Cicero speaking of Plato, with Clinias and Megillus, who were used to discourse *de Rerumpublicarum institutis, & optimis legibus*, in the Groves of Cypress, and other umbrageous recesses. It was under a vast Oak, growing in the park of St. Vincent's, near Paris, that St. Louis was used to hear complaints, determine causes, and do justice to such as resorted thither: And we read of a solemn treaty of peace held under a flourishing Elm between Gisors and Trier, which was afterwards felled by the French King Philip in a rage against King Henry II. for not agreeing to it. Nay, they have sometimes been known to crown their Kings under a goodly Tree, or in some venerable Grove, where they had their stations and conventions; for so they chose Abimelech. See Tostatus upon Judg. ix. 6. I read (in Chronicon Jo. Bromton) that Augustin the Monk (sent hither from the Pope) held a kind of council under a certain Oak in the West of England, and that concerning the great question, namely the right celebration of Easter, and the state of the Anglican Church, &c. where also it is reported he did a great miracle. In the mean time I meet with but one instance where this goodly tree has been (in our country) abused to cover impious designs, as was that of the Arch-Rebel Kett, who, in the reign of Edward VI. (becoming leader to that fanatic insurrection in Norfolk) made an Oak (under the specious name of * Reformation) the court, council-house, and place of convention, whence he set forth his traitorous edicts: The history and event of which, to the destruction of the Rebel and his followers, together with the sermon (call it speech, or what you please) which our then young Matthew Parker (afterward the venerable and learned Archbishop of Canterbury) boldly pronounced on it, to reduce them to obedience, is most elegantly described in Latin, and in a stile little inferior to the antients, by our countryman Alexander Nevill, in his *KETTUS: Sive de furoribus Norfolciensium KETTO Duce*. But to return: The Athenians were wont to consult of their gravest matters and public concerns in Groves. Famous for these assemblies were the Ceraunian, and at Rome the Lucus Petilinus, the Farentinus, and others, in which there was held that renowned parliament after the defeat of the Gauls by M. Popilius; for it was supposed

* *Quercus Reformationis.*

that in places so sacred they would faithfully and religiously observe what BOOK IV.
was concluded amongst them:

In such green palaces the first kings reign'd,
Slept in their shades, and angels entertain'd:
With such old counsellors they did advise,
And by frequenting sacred Groves grew wise:
Free from th' impediments of light and noise,
Man thus retir'd, his nobler thoughts employs. WALLER.

as our excellent poet has described it. And, amongst other weighty matters, they treated of matches for their children, and the young people made love in the cooler shades, and engraved their mistresses names upon the bark: *Tituli æreis literis insculpti*, as Pliny speaks of that antient Vatican Ilex; and Euripides in Hippolyto, where he shews us how they made the incision whisper their soft complaints, like that of Aristænetus, *Τοῖα δὲ ἡδὲ ἃ διδράς*, &c. and wish that it had but a soul and voice to tell Cydippe, the fair Cydippe, how she was beloved: And doubtless this character was antienter than that on paper. Let us hear the amorous Poet leaving his young couple thus courting each other:

Lib. xvi. cap.
44. Arist. lib.
ep. 10.

*Incisæ servant à te mea nomina fagi,
Et legor, Oenone, falce notata tuâ.
Et quantum trunci, tantum mea nomina crescunt:
Crescite, & in titulos surgite recta meos.* OVID. Ep.

Each Beech my name yet bears, carv'd out by thee,
Paris and his Oenone fill each tree;
And as they grew the letters larger spread,
Grow still a witness of my wrongs when dead!

Which doubtless he learnt of Maro, describing the unfortunate Gallus:

——— *Tenerisque meos incidere amores:
Arboribus: Crescent illæ, crescetis amores.* ECLOG. x.

There on the tender bark to carve my love;
And as they grow so may my hopes improve.

BOOK IV. And these pretty monuments of courtship, I find, were much us'd on the Cherry tree, (the wild one I suppose) which has a very smooth rind, as the witty Calphurnius:

Dic age, nam Cerasi tua cortice verba notabo;
Et decisa feram rutilanti carmina libro.

Repeat, thy words on Cherry bark I'll take,
And that red skin my table-book will make.

Let us add the sweet Propertius:

Ah quoties teneras resonant mea verba sub umbras,
Scribitur & vestris Cynthia Corticibus. *Eleg. xviii.*

* Theocrit.
Epithal. Helena
Idyll. 18.

And so deep were the incisions made, as that of Helena* on the Platan, (*ὡς παρίων τῆς ἀναγνώσεως*) that one might run and read them. And thus forsaken Lovers appeal to Pines, Beeches, and other trees of the forest. But we have dwelt too long on these trifles, omitting also what we might relate of feasting, banquetting, and other splendid entertainments under trees, nay, sometimes in the very bodies of them. But we will now change the scene, as the Egyptians did the mirth of their guests, when they served in a scull to make them more serious: For thus,

Amongst other uses of Groves, I read that some nations were wont to hang, not malefactors only, but their departed friends, and those whom they most esteemed, upon trees, as so much nearer to Heaven, and dedicated to God, believing it far more honourable than to be buried in the earth. And that some affected to repose rather in these woody places, Propertius seems to bespeak:

Di faciant mea ne terrâ locet ossa frequenti
Quâ facit assiduo tramite vulgus iter;
Post mortem tumuli sic infamantur amantum,
Me tegat arboreâ devia terra comâ.

The Gods forbid my bones in the high road
Should lie, by every wand'ring vulgar trod.
Thus buried lovers are to scorn expos'd;
My tomb in some by-arbor be inclos'd.

The same is affirmed of other septentrional people by Chr. Cilicus de Bello Dithmarico, lib. i. It was upon the trunk of a knotty and sturdy Oak the antient heroes were wont to hang the arms and weapons taken from the enemy, as trophies; as appears in the yet remaining stump of Marius at Rome, and the reverses of several medals. Famous for this was the pregnant Oleaster which grew in the Forum of Megara, on which the Heroes of old left their shields and bucklers, and other warlike harness, till in process of time it had covered them with successive coats of bark and timber, as it was afterwards found when Pericles sacked the city, which the Oracle predicted should be impregnable, till a tree should bring forth armour*. We have already mentioned Rebekah, and read of Kings themselves that honoured such places with their sepulchres: What else should be the meaning of 1 Chron. x. 12, when the valiant men of Jabez interred the bones of Saul and Jonathan under the Oak? Famous was the Hynrñthian Cœmetry where Diaphon lay. Ariadne's tomb was in the Amathusian Grove in Crete, now Candy; for they believed that the spirits and ghosts of men delighted to expatiate and appear in such solemn places, as the learned Grotius notes from Theophylact, speaking of the Dæmons, upon Matth. viii. 20; for which cause Plato gave permission, that trees should be planted over graves, to obumbrate and refresh them. The most antient *Conditoria* and burying places were in such memorous solitudes. The Hypogeum in Macpela, purchased by the patriarch Abraham of the sons of Heth, Gen. xxiii. for Sarah, his own dormitory, and family sepulchre, was conveyed to him with particular mention of all the Trees and Groves about it; and this is the very first precedent I ever read of conveying a Purchase by a formal Deed.

* Diod. Sic.
lib. xii.

Our blessed Saviour, as we shall shew, chose the garden sometimes for his Oratory—and dying, for the place of his Sepulchre; and we do avouch for many weighty causes, that there are no places more fit to bury our dead in than our gardens and groves, or airy fields, *sub dio*, where our beds may be decked and carpeted with verdant and fragrant flowers, trees, and perennial plants, the most natural and instructive hieroglyphics of our expected resurrection and immortality; besides what they might conduce to the meditation of the living, and the taking off our cogitations from dwelling too intently upon more vain and sensual objects; that custom of burying in churches, and near about them, (especially in great and populous cities) being a novel presumption, indecent, sordid, and very prejudicial to health; for which I am sorry it is become so customary.

BOOK IV. Graves and sepulchres were of old made and erected by the sides of the most frequented highways, which being many of them magnificent Structures and Mausoleums, adorned with statues and inscriptions, (planted about with Cypress and other Evergreens, and kept in repair) were not only graceful, but a noble and useful entertainment to the travellers, putting them in mind of the virtues and glorious actions of the persons buried; of which, I think, my Lord Verulam has somewhere spoken. However, there was certainly no permission for any to be buried within the walls of Rome, almost from the very foundation of it; for so was the Sanction, Tab. XII. IN URBE NE SEPELITO NEVE URITO, neither to bury or burn the dead in the city. And when long after they began to violate that law, Antoninus Pius, and the Emperor succeeding, did again prohibit it. All we meet of antient to the contrary, is of Cestius the Epulos Tomb, which is a thick clumsy pyramid yet standing, *nec in urbe, nec in orbe*, as it were, but half *in*, and half *without* the wall. If then it were counted a thing so profane to bury in the cities, much less would they have permitted it in their temples; nor was it in use among Christians, who, in the primitive ages, had no particular Cæmeteria; but when (not long after) it was indulged, it was to Martyrs only *ad limina*, and in the porches, even to the deposita of the Apostles* themselves. Princes indeed, and other illustrious persons, founders of churches, &c. had sometimes their Dormitories near the Basilicæ and Cathedrals, a little before St. Augustin's time, as appears by his book *de cura pro mortuis*, and the concession was not easily obtained. Constantine, son to the Great Constantine himself, did not, without leave, inhumè his Royal Father in the church porch of that august fabrick, though built by that famous Emperor: And yet after this, other great persons placed their sepulchres no nearer than towards the church walls, whilst in the body of the church, they presumed no farther for a long time after, as may be proved from the Capitula of Charlemagne; nor hardly in the city, till the time of Gregory the Great: and when connived at, it was complained of. We find it forbidden (as to churches) by the Emperors Gratian, Valentinian, and Theodosius; and so in the Code, where the Sanction runs thus: *Nemo Apostolorum vel Martyrum sedem humanis corporibus existimet esse † concessam*, &c. And now, after all this, would it not raise our indignation to suffer so many extortioners, luxurious, profane, and very mean persons, without merit, not only affecting, but permitted to lay their carcases, not in the nave and body of the church only, but in the very chancel, next the communion table, ripping up the pavements, removing the seats, &c. for

* See that passage of the famous Civilian Baldwin, ad leg. xii. Tab.

Chrys. Hom. xxvi. Epist. ad Corinth.

† Gretzer. lib. ii. de Fun. Christi, cap. 8. Onuphr. de Ritu Sepul.

Some little gratification of those who should have more respect to decency Book IV.
at least, if for no other.

The fields, the mountains, the highway-sides, and gardens, were thought enough honourable for those funeral purposes: Abraham and the Patriarchs (as we have shewed) had their Caves and Crypta in the fields, set about with trees: The kings of Judah, their sepulchres in their palaces, not the sanctuary and temple: And our most blessed Saviour's was in a garden; which indeed seems to me to be the most proper and eligible, as we have already shewed; nor even to this day do the Greeks and Eastern Christians bury in churches, as is well known. A remarkable instance apposite to this, we have of a worthy person of our own country, Mr. Burton, great grandfather of the learned Author who writ the Commentary on Antoninus's Itinerary; which, for its laudable singularity, I present my reader the description of.

In agro Salopiensi Longnoræ ad Sabrinam, Fl. ad piscinas in horto juxta ædes patruelis mei Francisci Burtoni, proavi mei Epitaphium.

1558.

- * Quod scelus? an Christi nomen temerare quòd ausus,
Hinc vetitum sacro condere membra solo? —
Dì melius — sincera fides, nec tramite veri
Devia, causa, illo tempore, grande nefas,
Urbibus insultat nostris dum turbida ROMA;
Rasæque gens sacris dat sua jura locis;
Nec sacri ritus, nec honores funeris, intra
Mœnia, Christicolis, heu male sancta! piis. —
At referens Domini inculpata munera vitæ,
Ad Domini Exemplar funera nactus erat,
Ille ut odorifero tumulatus marmore in horto,
Ossa etiam redolens hortus & hujus habet;
Hic ubi et expectat, fœlix! resonantia verba
“Ergo age! Mercedem jam, bone serve, cape.”

NOTES.

* His great grandson has recorded his death, which was very remarkable: “Having been under persecution for his religion in the days of Queen Mary, and obliged to live very retired in order to escape from her fury, sitting one day in his upper parlour at Longnor, he heard all the bells in Shrewsbury ring; his right-divining soul strait told him that it was for the death of Queen Mary; he enquired, and having learned that it

BOOK IV. Thus, with the incomparable Sannazarius, *Non mihi fornicibus Pariis.*—
Sculptures and Titles preferable to the proudest *Mausoleums* I should choose.

The late elegant and accomplished Sir W. Temple, though he laid not his whole body in his garden, deposited the better part of it, his heart, there; and if my executors will gratify me in what I have desired, I wish my corpse may be interred as I have bespoke them; not at all out of singularity, or for want of a Dormitory, (of which there is an ample one annexed to the parish church) but for other reasons, not here necessary to trouble the reader with, what I have said in general being sufficient: However, let them order it as they think fit, so it be not in the church or chancel.

Plato, as we noted, permitted trees to be planted over sepulchres, to obumbrate the departed; but with better reason we adorn their groves with flowers and redolent plants, just emblems of the life of man, which has been compared in Holy Scripture to those fading beauties, whose roots being buried in dishonour, rise again in glory. Of such hortulan instances, Gruter gives us this inscription:

Gruteri Corpus, p. 636,
12.

V. F.
T. VETTIUS. T. L.
HERMES
SEPLASIARIUS
MATER. GENUIT. MATER. RECEPIT
HI. HORTI. ITA. UTI. OPT. MAXIMIQ. SUNT
CINERIBUS. SERVIAINT. MEIS
NAM. CURATORES. SUBSTITUAM
QUI. VESCANTUR
EX. HORUM. HORTORUM. REDITU
NATALI. MEO
ET. PRAEBEANT. ROSAM. IN. PERPETUUM
HOS. NEQUE. DIVIDI
NEQUE. ALIENARI. VOLO

N O T E S.

was certainly so, through the excess of the joy which he conceived, instantly expired.” The Epitaph was written by Sir Andrew Corbet, A. D. 1614, in English, whence Mr. Burton, the Commentator on Antoninus, turned it into the Latin exhibited by Mr. Evelyn.—Elizabeth had not yet had time to open the consecrated ground for the reception of Protestants.

This sweet flower, borne on a branch full set with Thorns, and accompanied with the Lily, are natural hieroglyphics of our fugitive, umbratile, anxious, and transitory life, which making so fair a shew for a time, is not yet without its thorns and crosses.

Of this kind, and the like antiquity, we could multiply instances; nor is the custom yet altogether extinct in my own native county of Surry, and near my dwelling, where the Maidens yearly plant and deck the graves of their defunct Sweethearts with Rose-bushes; of which I have given account in the learned Mr. Gibbon's Edition of Camden; and for the rest, see Mr. Sumner of Garden-Burial, and the learned Dr. Cave's Primitive Christianity.

And now let not what I have said, concerning the pious Dr. Hammond's Paraphrase in the Text, of Hortulan Burial, be thought foreign to my subject, since it takes in the custom of it in the Groves, and shady and solemn places, as I have already shewed: And thus the Yew, planted in our country church-yards, the Cypress, growing so like a shroud as does that sepulchral tree, and other perennial greens, emblems of immortality, and a flourishing state to come, were not less proper to shade our natural bed, would our climate suffer it.

Let us return then to Groves, and for diversion add a short recital of the most famous Groves which we find celebrated in histories; since those, besides many already mentioned, were such as, being consecrated both to Gods and Men, bore their names. Amongst these are reckoned such as were sacred to Minerva, Isis, Latona, Cybele, Osiris, Æsculapius, Diana, and especially the Aricinian, in which there was a goodly temple erected, placed in the midst of an island, with a vast lake about it, a mount and a Grotto adorned with statues, and irrigated with plentiful streams: And this was that renowned recess of Numa, where he so frequently conversed with his *Egeria*, as did Minos in the cave of Jupiter; and by whose pretended inspirations they gained the deceived people, and made them receive what laws they pleased to impose upon them. To these we may join the Groves of Vulcan, Venus, and the little youth Cupid; of Mars, Bellona, Bacchus, Silvanus, and that of the Muses near Helicon, dedicated by the same Numa, their great Patron; and hence had they their

BOOK IV. name *Camæna**. In this was the noble statue of Eupheme, nurse to those Poetical Ladies; and so the Feronian, and even *Mons Parnassus*, were thick shaded with trees. Nor may we omit the more impure *Lupercal Groves*, sacred, or profaned rather, yet most famous for their affording shelter and foster to Romulus and his brother Remus.

That of Vulcan was usually guarded by dogs, like the town of St. Malo's in Bretagne: The Pinea Silva appertained to the Mother of the Gods, as we find in Virgil. Venus had several Groves in Egypt, and in the Indian island, where once stood those famous statues cut by Praxiteles; another also in Pontus, where, if you will believe it, hung up the Golden Fleece, meed of the bold Adventurer. Nor was the watry king Neptune without his Groves, the Helicean in Greece was his. So Ceres, and Proserpine, Pluto, Vesta, Castor, and Pollux, had such shady places consecrated to them: Add to these the Lebadian, Arfinoan, Paphian, Senonian, and such as were in general dedicated to all the Gods, for

—————Habitarunt Di quoque Silvas.

—————Gods have dwelt in Groves.

and these were as it were Pantheons.——

To the memory of famous Men and Heroes were consecrated the Achillean, Aglauran, and those to Bellerophon, Hector, and Alexander; to others also who disdained not to derive their names from trees and forests, as Silvius the Posthumus of Æneas, and divers of the Albanian Princes and great persons; Stolon, Laura, Daphnis, &c. And a certain custom there was for the parents to plant a tree at the birth of an heir or son, presaging by the growth and thriving of the tree the prosperity of the child: Thus we read in the life of Virgil, how far his natalitial Poplar

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* The learned and ingenious Mr. Bryant is the only person who has given us a satisfactory derivation of the word *Camæna*. He says, the *Camœnæ* of Latium, who were supposed to have shewn the sacred Fountain to the Vestals, were probably the original Priestesses, whose business it was to fetch water for Lustrations from that Stream. For *Cam-Ain* (in the Amonian language) is the Fountain of the Sun: and the *Camœnæ* were named from their attendance upon that Deity. The Hymns in the Temples of this God were sung by these Women: Hence the *Camœnæ* were made Presidents of Music. *Analystis*, Vol. I.

had outstripped the rest of its contemporaries. And the reason doubtless of all this was the general repute of the sanctity of those places; for no sooner does the Poet speak of a Grove, but immediately some consecration follows, as believing that out of those shady profundities some Deity must needs emerge:

Quo possis viso dicere Numen inest.

So as Tacitus (speaking of the Germans) says, *Lucos & Nemora consecrant, Deorumque nominibus appellant secretum illud, quod sola reverentia vident*: To the same purpose, Pliny, lib. xii. cap. 1. tells us, *Arbores fuere Numinum templa*, in which (says he) they did not so much revere the golden and ivory statues, as the goodly trees and awful silence: and the consecration of these nemorous places, together with the express rites thereof, we find in Quintus Curtius, and in what Paulus Diaconus relates of the Longobards, who not being capable of philosophising on the physical causes, which they deemed supernatural, and plainly divine, were allured, as it is likely, by the gloominess of the shade, procerity and altitude of the stem, floridness of the leaves, and other accidents; so as to use the words of Prudentius,

Quos penes omne sacrum est; quicquid formido tremendum
Suaferit horificos, quos prodigalia cogunt
Monstra Deos———

Lib. ii. Cont. Sym.

Here all religion paid; whose dark recess
A sacred awe does on their mind impress,
To their wild Gods———

And this deification of their trees, amongst other things, besides their age and perennial veridity, says Diodorus, might spring from the manifold use which they afforded, and which haply had been taught them by the Gods, or rather by some god-like persons, whom for their worth, and the public benefit, they esteemed so; and it might be a motive to this reverence, that divers of them were voiced to have been metamorphosed from men into trees, and again out of trees into men, as the Arcadians gloried in their birth, when:

Gensque virum, truncis, & rupto Robore nati.

Out of the teeming bark of Oaks men burst:

BOOK IV. Which perhaps they fancied, by seeing men creep sometimes out of their cavities, in which they often lodged and secured themselves :

Quippe aliter tunc orbe novo cœloque recenti
Vivebant homines, qui rupto Robore nati.

JUVEN. lib. ii.

For in the earth's nonage under heav'n's new frame,
They stricter liv'd, who from Oaks rupture came.

Or as the sweet Papinius again :

————Nemorum vos stirpe rigenti
——Fama fatos, cum prima pedum vestigia tellus
Admirata tulit, nondum arva, domûsque ferebant,
Cruda puerperia, ac populos umbrosa creavit
Fraxinus, & fœtâ viridis puer excidit Orno :
Hi lucis stupuisse vices, noctisque feruntur,
Nubila, & occiduum longe Titana secuti
Desperâsse diem——

Fame goes, that ye brake forth from the hard rind,
When the new earth with the first feet was sign'd :
Fields yet nor houses doleful pangs reliev'd,
But shady Ash the num'rous births receiv'd,
And the green babe drop'd from the pregnant Elm,
Whom strange amazement first did overwhelm
At break of day, and when the gloomy night
Ravish'd the sun from their pursuing sight,
Gave it for lost——

Almost like that which Rinaldo saw in the enchanted forest :

Quercia gli appar, che perse stessa incisa
Aprè seconda il cavo ventre, è figlia ;
En' esce fuor vestita in strana guisa
Ninfa d' età cresciuta——

CANTO 18.

An aged Oak besides him cleft and rent,
And from his fertile hollow womb forth went

(Clad in rare weeds, and strange habiliment)

A full-grown Nymph.——

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And that every great tree included a certain tutelar Genius or Nymph living and dying with it, the Poets are full; a special instance we have in that prodigious Oak which fell by the fatal stroke of Erifichthon; but the Hamadryads, it seems, were immortal, and had power to remove and change their wooden habitations.

In the mean while, as the fall of a very aged Oak, giving a crack like thunder, has been often heard at many miles distance, constrained though I often am to fell them with reluctance, I do not at any time remember to have heard the groans of those nymphs (grieving to be dispossessed of their antient habitations) without some emotion and pity. Now to shew that many such disasters as that which befell Erifichthon have happened to the owners of places where goodly trees have been felled, I cannot forget *one*, who giving the first stroke of the ax with his own hand, and doubtless pursuing it with more, killed his own *Father* by the fall of the tree, not without giving the uncautious *Knight* (for so he was) sufficient warning to avoid it. And here I must not pass by the *Groaning-Board* which they kept for a while in Southwark, drawing abundance of people to see the wonder; such another plant had been formerly, it seems, exposed as a miracle at *Caumont*, near *Toulouse*, in France; and the like sometimes happens in woods and forests, through the inclusion of the air within the cavities of the timber; and something of this kind perhaps gave heretofore occasion of the fabulous *Dodonean Oracle*. But however this were, methinks I still hear, sure I am that I still feel, the dismal groans of our forests; that late dreadful hurricane (happening on the 26th of November, 1703) having subverted so many thousands of goodly Oaks, prostrating the trees, laying them in ghastly postures, like whole regiments fallen in battle by the sword of the Conqueror, and crushing all that grew beneath them. Such was the prospect of many miles in several places, resembling that of Mount Taurus, so naturally described by the Poet, speaking of the fall of the Minotaurs slain by Theseus:

———*Illa procul radicitus exturbata,*

Prona cadit, late quacumvis obvia frangens.

The losses and dreadful stories of this ruin were indeed great, but how much greater the universal devastation through the kingdom! The public

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accounts reckon no less than 3000 brave Oaks in one part only of the Forest of Dean blown down; in New-Forest in Hampshire, about 4000; and in about 450 Parks and Groves, from 200 large trees to 1000 of excellent timber, without counting fruit and orchard trees sans number; and proportionably the same through all the considerable woods of the nation.

Sir Edward Harly had 1300 blown down; myself above 2000; several of which, torn up by their fall, raised mounds of earth near twenty feet high, with great stones intangled among the roots and rubbish; and this almost within sight of my dwelling, (now no longer * Wotton) sufficient to mortify and change my too great affection and application to this work, which, as I contentedly submit to, so I thank God for what are yet left standing: *Nepotibus umbram*.

* Wood-Town.

Laërtius reports of a people who worshipped the *Wind*, as some at this day among the Indians do the *Devil*, that he may do them no harm.

What this Prince of the Air did to *Job* and his religious family, for the trial of his patience, by God's permission, the Scripture tells us: And for what cause he still suffers that malicious spirit to exert his fury in these lower regions, the same God only knows; though certainly for our chastisement; and therefore reformation, submission, and patience will become our best security.

Scaliger the Father affirms, he could never convince his learned antagonist Erasmus, but that trees feel the first stroke of the ax, and discover a certain resentment; and indeed they seem to hold the edge of the fatal tool, till a wide gap be made: And so exceedingly apprehensive they are of their destruction, that, as *Zoroaster* says, if a man come with a sharp bill intending to fell a *barren tree*, and a friend importunately deprecate the angry person, and prevail with him to spare it, the tree will infallibly bear plentifully the next year. Such is the superstitious sanctity and folly of some credulous people.

We might here indeed produce the wonderful strange Apparitions of Spirits interceding for the standing and life of trees, when the ax has been ready for execution; as you may see in that Hymn of Callimachus, Pausanias, and the famous story of Paræbius, related by Apollonius in 2 *Argonaut*. with the fearful catastrophe of such as causelessly and wantonly

violated those goodly plantations (from which fables arose that of the Dodonean and Vocal Forests, frequent in Heathen Writers); but in none so elegantly as in that tale by the witty Ovid, describing the fact of the wicked Erichthon:

As Fame reports, his Hand an Ax sustain'd,
Which Ceres' consecrated Grove prophan'd;
Which durst the venerable Gloom invade,
And violate with Light the awful Shade.
An antient Oak in the dark Centre stood,
The Covert's Glory, and itself a Wood:
Garlands embrac'd its Shaft, and from the Boughs
Hung Tablets, Monuments of prosp'rous Vows.
In the cool Dusk its unpierc'd Verdure spread,
The Dryads oft their hallow'd Dances led;
And oft, when round their gaging Arms they cast,
Full fifteen Ells it measur'd in the Waist:
Its Height all under Standards did surpass,
As they aspir'd above the humbler Grass.

These Motives, which would gentler Minds restrain,
Could not make Triope's bold Son abstain;
He sternly charg'd his Slaves with strict Decree,
To fell with gashing Steel the sacred Tree.
But whilst they, ling'ring, his Commands delay'd,
He snatch'd an Ax, and thus blaspheming said;
Was this no Oak, nor Ceres' favourite Care,
But Ceres' self, this Arm, unaw'd, shou'd dare
Its leafy Honours in the Dust to spread,
And level with the Earth its airy Head.
He spoke, and as he pois'd a slanting Stroke,
Sighs heav'd, and Tremblings shook the frighted Oak;
Its leaves look'd sickly, pale its Acorns grew,
And its long Branches sweat a chilly Dew.
But when his impious Hand a Wound bestow'd,
Blood from the mangled Bark in Currents flow'd.
When a devoted Bull of mighty Size,
A sinning Nation's grand Atonement, dies;
With such a Plenty from the spouting Veins,
A crimson Stream the turfy Altars stains.

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The Wonder all amaz'd; yet one more bold,
 The Fact dissuading, strove his Ax to hold.
 But the Theſſalian, obſtinately bent,
 Too proud to change, too harden'd to repent,
 On his kind Monitor, his Eyes, which burn'd
 With Rage, and with his Eyes his Weapon turn'd;
 Take the Reward, ſays he, of pious Dread:
 Then with a Blow lopp'd off his parted Head.
 No longer check'd, the Wretch his Crime purſu'd,
 Doubled his Strokes, and Sacrilege renew'd;
 When from the groaning Trunk a Voice was heard,
 A Dryad I, by Ceres' Love preferr'd,
 Within the Circle of this clasp'ing Kind
 Coëval grew, and now in Ruin join'd;
 But instant Vengeance ſhall thy Sin purſue,
 And Death is cheer'd with this prophetick View.

At laſt the Oak with Cords enforc'd to bow,
 Strain'd from the Top, and ſap'd with Wounds below,
 The humbler Wood, Partaker of its Fate,
 Cruſh'd with its Fall, and ſhiver'd with its Weight.

DRYDEN'S OVID.

But a ſad revenge follows it, as the Poet will tell you: And one might fill a juſt volume with the Hiſtories of Groves that were violated by wicked men who came to fatal periods, eſpecially thoſe upon which the Miſleto grew, than which nothing was reputed more ſacred; for amongſt ſuch Oaks the Druids uſually dwelt,

Nemora alta remotis
 Incolitis Lucis ———— LUCAN.

and with whoſe leaves they adorned and celebrated their Religious Rites. "The Druids," ſays Pliny, lib. xvii. cap. xlii. "for ſo they call their Divines, eſteem nothing more venerable than Miſleto, and the Oak upon which it grows." Indeed they did nothing of importance without ſome leaves or branches of this tree; and they eſteemed its very *excreſcence* as ſent from Heaven. The Miſleto was not to be gathered, but cut by the Priest with a golden ax, praying for a bleſſing upon the Divine Gift; after

this two white bulls were offered up as a sacrifice. But for this consult (besides Pliny) *Mela*, *Lactantius*, *Eusebius de præparat. Evangel.* and the *Aulularia* of *Pseudo-Plautus*, *Camden*, and others; whilst, as to that *excrecence*, I relate the disasters which happened to two men who, not long since, felled a goodly tree, called the *Vicar's Oak*, standing at *Norwood*, (not far from *Croydon*) partly belonging to the Archbishop, and was limit to four parishes which met in a point; on this Oak grew an extraordinary branch of Mistletoe, which in the time of the *sacriligious usurpers* they were wont to cut and sell to an Apothecary of London; and though warned of the misfortunes observed to befall those who injured this *plant*, proceeded not only to cut it quite off, without leaving a sprig remaining, but to demolish and fell the Oak itself also. The first soon after lost his eye, and the other broke his leg, as if the *Hamadryads* had revenged the indignity.

It is reported that the *Minturensian Grove* was esteemed so venerable, that a stranger might not be admitted into it; and the great Xerxes himself, when he passed through Achaia, would not touch a Grove which was dedicated to Jupiter, commanding his army to do it no violence; and the honours he did to one single (but a goodly) *Platanus*, we have already mentioned. The like to this we find when the Persians were put to flight by Pausanias; though they might have saved their lives by it, as appears in the story. The same reverence made Hercules not so much as taste the waters of the *Ægerian Groves*, after he slew Cacus, though extremely thirsty.

————— At talibus alma sacerdos

Puniceo canas stamine vincta comas :

Parce oculis, hospes, Lucoque abscede verendo,

Cede agedum, & tuta limina linque fuga.

Interdicta viris metuenda lege piatur,

Quæ se summotâ vindicat ara casa.

Dii tibi dent alios fontes —————

PROPERT. l. iv.

————— The Priestess said,

(A purple fillet bound her hoary head)

Stranger, pry not, but quit this shady seat :

Avant, and whiles thou safely may'st, retreat.

To men forbid, and by hard sanction bound :

Far better other springs were by thee found.

BOOK IV. Nor indeed was it lawful to hunt in such places, unless it were to kill for sacrifice, as we read in Arrianus; whence it is reported by Strabo, that in the Ætolian Groves, sacred to Diana, the beasts were so tame, that the very wolves and stags fed together like lambs, and would follow a man licking his hands, and fawning on him. Such a Grove was the *Crotonian*, in which Livy writes, there was a spacious field stored with all sorts of game. There were many forests consecrated to *Jupiter*, *Juno*, and *Apollo*; especially the famous *Epidaphne*, near the Syrian *Antioch*, which was most incomparably pleasant, and adorned with fountains and rare statues.

* See this delicious place elegantly described by S. Chrysostom, lib. de S. Babylon. tom. vi. p. 671. Sozom. lib. vi. cap. xix. Niceph. lib. x. cap. xxviii.

There was to be seen the *Laurel* which had been his chaste *Mistress*, and in the centre of it his *Temple*, an *Asylum*: Here it was that *Cesroes* and *Julian* did sacrifice upon several occasions, as *Eusebius* relates, but could not with all their impious arts obtain an answer, because the holy *Babylas* had been interred near that Oracle; for which it was reputed so venerable, that there remained an express Title in the Code, *de Cupressis ex Lucu Daphnes non excidendis, vel venundandis*, “that none should either fell or sell any of the trees about it,” which may serve for another instance of their burying in such places. The truth is, so exceedingly superstitious they were, and tender, that there was almost no meddling with these devoted trees; and even before they did but *conlucare* and prune one of them, they were first to sacrifice, lest they might offend in something ignorantly: But to *cut down* was *capital*, and never to be done away with any offering whatsoever; and therefore *conlucare* in authors is not (as some pretend) *succidere*, but to *prune* the branches only; and yet even this gentle tonsure of superfluities was reputed a kind of contamination; and hence *Lucus coinquinari dicitur*, unless in the case of *Lightning*, when *Cælo tacta*, a whole tree might quite be felled, as marked by Heaven for the fire: But of this sufficient. We could indeed fill many sheets with the catastrophe of such as maliciously destroyed Groves, to feed either their revenge or avarice; see Plutarch in Pericles, and the saying of Pompeius. Cicero sharply reproves C. Gabinius for his prodigious spoil in Greece; and it was of late days held a piece of inhumanity in Charles the French King, when he entered the Frisons, after he had slain their leader, to cut down their woods; a punishment never inflicted by sober Princes, but to prevent Idolatry in the old Law, and to shew the heinousness of disloyalty and treason by latter sanctions; in which case, and for terror, even a traitor’s woods have become anathema, as were easy to instance out of histories.

Salmaf. exer. Plin. Solin.

But what shall we say then of our late prodigious *Spoilers*, whose furious devastation of so many goodly woods and forests have bequeathed an

infamy on their names and memories, not quickly to be forgotten! I mean our unhappy *Ufurpers* and injurious *Sequestrators*; not here to mention the deplorable necessities of a gallant and loyal *Gentry*, who, for their *Compositions*, were, many of them, compelled to add yet to this *Waste*, by an inhuman and unparalleled *Tyranny* over them, to preserve the poor remainder of their *Fortunes* and to find them *Bread*.

Nor was it here they desisted; for after the fate of that once beautiful Grove under Greenwich castle, (of late supplied by his present Majesty) even the royal walk of Elms in St. James's park

“That living gallery of aged trees,”

was once proposed to the late Council of State (as they called it) to be cut down and sold; that, with the rest of his Majesty's houses already demolished, and marked out for destruction, his trees might likewise undergo the same destiny, and no footsteps of *monarchy* remain unviolated.

It is from hence you may calculate what were the *designs* of those excellent *Reformers*, and the care these great *Statesmen* took for the preservation of their *country*, when, being *parties* in the *booty* themselves, they gave way to so dishonourable and impolitick a *waste* of that *material*, which being left entire, or husbanded with discretion, had proved the best support and defence of it. But this (say they) was the effect of *war*, and in the height of our *contentions*. No, it was a *late* and *cold deliberation*, and long after all had been subdued to them; nor could the most implacable of *enemies* have expressed a resolution more barbarous. For, as our own incomparable Poet describes it,

———’Twas not enough alone to take the spoils
Of God's and the king's houses; these unjust
And impious men destroy the stately piles:
Of ev'ry ruin there's a wicked lust.

In every place the groaning carts are fill'd
With beams and stones; so busy and so loud
Are the proud victors, as they meant to build:
But they to ruin and destruction crowd.

Timber, which had been buried many years
Under such royal towers, they invade:

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'Tis sure that hand the living never spares,
Which is so wicked to disturb the dead.

Then all the woods the barbarous victors seize,
(The noble nursery of the fleet and town,
The hopes of war and ornaments of peace)
Which once religion did as sacred own.

Now public use, and great convenience claims,
The woods from private hands inviolate;
Which greedy men, to less devouring flames,
Do for sweet lucre freely dedicate.

No age they spare, the tender Elm and Beech,
Infants of thirty years they overthrow;
Nor could old age itself their pity reach,
No reverence to hoary barks they know.

The unhappy birds, an ever-singing choir,
Are driven from their antient shady seats,
And a new grief does Philomel inspire
With mournful notes, which she all night repeats.

Let them the woods and forest burn and waste,
There will be trees to hang the slaves at last;
And God, who such infernal men disclaims,
Will root 'em out, and throw 'em into flames.

In which he has shewed himself as well a *Prophet* as a *Poet*.

We have spoken of the great Xerxes, that, passing conqueror through *Acbaia*, he would not suffer his army to violate so much as a tree of his adversaries; and have sufficiently observed from the antients, that the Gods did never permit them to escape unpunished who were injurious to *Groves*. What became of Agamemnon's host after his spoil of the woods at Aulis? Histories tell us Cleomenes died mad: The *Temejean Genius* became proverbial; and the destructive fact that the enraged Cæsar perpetrated on the *Mafflian* trees, went not long unrevenge'd; thus related

by the poet, and an illustrious record of all we have hitherto produced, to assert their veneration.

BOOK IV.

Lucus erat longo nunquam violatus ab ævo, &c. LUCAN, lib. iii.

Not far away for ages past had stood
 An old inviolated sacred wood;
 Whose gloomy boughs, thick interwoven, made
 A chilly cheerless everlasting shade:
 There, nor the rustic gods, nor satyrs sport,
 Nor fawns and sylvans with the nymphs resort:
 But barb'rous priests some dreadful pow'r adore,
 And lustrate ev'ry tree with human gore.
 If mysteries in times of old receiv'd,
 And pious antientry be yet believ'd,
 There nor the feather'd songster builds her nest,
 Nor lonely dens conceal the savage beast:
 There no tempestuous winds presume to fly,
 Ev'n lightnings glance aloof, and shoot obliquely by.
 No wanton breezes toils the dancing leaves,
 But shiv'ring horror in the branches heaves.
 Black springs with pitchy streams divide the ground,
 And bubbling tumble with a fullen sound.
 Old images of forms mishapen stand,
 Rude and unknowing of the artist's hand;
 With hoary filth begrim'd, each ghastly head
 Strikes the astonish'd gazer's soul with dread.
 No gods, who long in common shapes appear'd,
 Where'er with such religious awe rever'd:
 But zealous crouds in ignorance adore,
 And still the less they know, they fear the more.
 Oft (as fame tells) the earth in sounds of woe
 Is heard to grone from hollow depths below:
 The baleful yew, tho' dead, has oft been seen
 To rise from earth, and spring with dusky green;
 With sparkling flames the trees unburning shine,
 And round their boles prodigious serpents twine.
 The pious worshippers approach not near,
 But shun their gods, and kneel with distant fear:

Lucum Escu-
 lapio dicatum
 succiderat
 Turullius;
 manifestis Nu-
 minis illius vi-
 ribus, cum in
 Lucum quem
 violaverat, ille
 attractus est,
 effecitque
 Deus ut ibi
 potissimum
 occideretur.
 Vide Valer.
 Max. lib. i.
 cap. i. n. 19.

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The priest himself, when, or the day, or night,
 Rolling have reach'd their full meridian height,
 Refrains the gloomy paths with wary feet,
 Dreading the Dæmon of the Grove to meet;
 Who, terrible to fight, at that fix'd hour,
 Still treads the round about his dreary bow'r.

This wood, near neighb'ring to the encompass'd town,
 Untouch'd by former wars remain'd alone;
 And since the country round it naked stands,
 From hence the Latian Chief supplies demands.
 But lo! the bolder hands, that should have struck,
 With some unusual horror trembling shook;
 With silent dread and rev'rence they survey'd
 The gloom majestic of the sacred shade:
 None dares with impious steel the bark to rend,
 Left on himself the destin'd stroke descend.
 Cæsar perceiv'd the spreading fear to grow,
 Then, eager, caught an ax, and aim'd a blow.
 Deep sunk within a violated Oak
 The wounding edge, and thus the warrior spoke:
 Now, let no doubting hand the task decline;
 Cut you the wood, and let the guilt be mine.

And so it was, as he carried (it is thought) the *maledictions* of the incensed Gauls to his funeral pile:

— Quis enim lætos impune putaret.
 Esse deos —

— For who,
 The Gods thus injur'd, unreveng'd does go?

But, lest this be charged with superstition, because the instances are heathen, it was a more noble and remarkable, as well as recent example, when, at the siege of *Breda*, the late famous General Spinola commanded his army not to violate a tree of a certain wood belonging to the Prince of Orange there, though a reputed traitor, and in open defiance with his master. In *sum*, we read, that when Mithridates but deliberated about

the cutting down of some stately trees which grew near *Patara*, a city of *Lycia*, though necessitated to it for the building of warlike engines with them, being terrified in a vision, he desisted from his purpose. It were to be wished that these, or the like examples, might have wrought some effects upon the sacrilegious *purchasers* and disloyal *invaders* in this iron age amongst us, who, to gratify an impious and unworthy avarice, have lately made so prodigious a spoil of those goodly forests, woods, and trees, which, being once the treasure and ornament of this nation, were doubtless reserved by our more prudent ancestors for the repairs of our floating castles, the safeguard and boast of this renowned island, when necessity, or some imminent peril should threaten it, or call for their assistance, and not transmitted to be devoured by these improvident wretches, who, to their eternal reproach, did, together with the Royal Patrimony, swallow likewise God's own inheritance. But their sons and grand children we have lived to see as hastily disgorge them again, and with them all the rest of their holy purchases, which otherwise they might securely have enjoyed. But this, *in terrorem* only, and for caution to posterity, whiles we leave the guilty, and those who have done the mischiefs, to their proper Scorpions, and to their Erisichthonian fate, or to that of the inexorable Paræbius, the vengeance of the Dryads; and to their tutelar better genius, if any yet remain who love the solid honour and ornament of their country: For (though constrained by necessity myself, to cut down so many goodly trees and venerable woods, devoted to the ax by the owner, who had a right to dispose of them before me) ὕλογενής, and Wood-born* as I am, what could I say less in behalf of those sacred shades, which both grace our habitations, and protect our nation?

Quæ tibi sacro-
rum pœnas in-
stare tuorum
Vaticinor—

Vide Met. l. 8.
Apollon. l. 2.
Argonaut.
Proserpit
Quercum fun-
nestam quam
sibi Nympha
Pignori busque
suis fecit—

* At Wotton
in Surry.

So in all ages, from trees have been denominated whole countries, regions, cities, and towns; as *Cyparissa* in Greece, *Cerasus* in Pontus, *Laurerentum* in Italy, *Myrrhinus* in Attica. Ports also, mountains and eminent places; as the *Viminalis*, *Æsculetum*, &c. and the obvious reason is the spontaneous growth and abounding of such trees in the respective soil. The reverse is sometimes observed; *Avellana nux* is called also *Prænestina*, *Pontica*; dum unaqueque natio indit huic nuci nomen ex loco in quo nascitur copiosior: So the Chestnut is called *Heracleotica*, of which see *Macrob. Saturnal. lib. iii.* *Sylvius* became a great and famous name among the Latins and Romans, as *Sylvius Posthumus*, the Son of that renowned Hero *Æneas Sylvius*; and in time an hereditary name among the subse-

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quent kings: Latinus Sylvius, Alba Sylvius, who built that glorious city which contended with Rome herself. To return to our own country: Seven Oaks in Kent was so called, as reported, from some goodly Oaks growing about it; and Old Sarum, or Sorbjodunum, had its name à *Sorbis*.

Hence also from the plenty of Beech trees does Mr. Camden denominate the whole country of Buckingham, Bukenham in Norfolk, Buchonia in Germany, &c. though indeed the learned Author of the Additions to the late Edition, thinks them rather so called from the Saxon Bue (*Cervus*) a buck or hart, and this from that in Norfolk, as Sir Henry Spelman reports, there are no such trees growing; whilst we yet know not whether there may not formerly have been store: In all events, be it one or the other, it is certain, abundance of places, countries, and families, have taken their denomination from trees.

One thing more I think not impertinent to hint, before I take my leave of this Book, concerning the Use of Standing Groves: That in some places of the world they have no other water to drink than what their trees afford them; not only of their proper juice, (as we have noted) but from their attraction of the Evening Moisture, which impends in the shape of a cloud over them: Such a tuft of trees is in the island of Ferro; of which consult the learned Isaac Vossius upon Pomponius Mela, and Magnenus de Manna: The same likewise happeneth in the Indies; so that if their woods were once destroyed, they might perish for want of rains; upon which account Barbadoes grows every year more torrid, and has not near the rain it formerly enjoyed when it was better furnished with trees; and so in Jamaica, at Gunaboa, the rains are observed to diminish as their plantations extend: The like I could tell you of some parts of England not far from hence.

And now, lastly, to encourage those to plant that have opportunity, and those who innocently and with reluctance are forced to cut down, and endeavour to supply the waste with their utmost industry: It is observed, that such planters are often blessed with health and old age, according to that of the prophet Isaiah, lx. 22. "The days of a tree are the days of my people." Of their extraordinary longævity we have given abundant instances in this Discourse; and it seems to be so universally remarked, that as Paulus Venetus (that great traveller) reports, the Tartarian Astrologers

affirm, nothing contributes more to men's long lives than the planting of many trees. *HÆC SCRIPSI OCTAGENARIUS*, and shall, if God protract my years, and continue my health, be continually planting, till it shall please him to *transplant* me into those glorious regions above, the celestial paradise, planted with Perennial Groves and Trees, bearing immortal fruit; for such is the tree of life, which they who do his commandments have right to, Apoc. xxii. 2, 14, 20. Ναὶ ἔρχομαι ταχὺ, Ἀμὲν, ναὶ, ἔρχου Κύριε Ἰησοῦ, Ἀμὲν.

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Thus my reader sees, and I acknowledge, how easy it is to be lost in the wood, and that I have hardly power to take off my pen whilst I am on this delightful subject; for what more august, more charming, and useful, than the culture and preservation of such goodly plantations:

That shade to our grand-children give.

VIRGIL.

What affords so sweet and so agreeable refreshment to our industrious Wood-man,

When he his wearied limbs has laid

Under a florid Platan's shade,

CLAUDIAN.

or some other goodly-spreading tree, such as we told you stopt the legions of a proud Conqueror, and that the wise Socrates swore by?

But whilst we condemn this excess in them, Christians and true Philosophers may be instructed to make use of their enjoyments to better purposes, by contemplating the miracles of their production and structure. And what Mortal is there so perfect an Atomist, who will undertake to detect the thousandth part, or point, of so exile a grain, as that insensible rudiment, or rather halituous spirit, which brings forth the lofty Fir-tree, and the spreading Oak? That trees of so enormous an height and magnitude, as we find some Elms, Planes, and Cypresses; that others hard as iron, and solid as marble, (for such the Indies furnish) should be swaddled and involved within so small a dimension, (if a point may be said to have any) and in so weak and feeble a substance, without the least luxation, confusion, or disorder of parts! That when they are buried in the moist womb of the earth, which so easily dissolves and corrupts substances so much harder, yet this, which is at first but a kind of tender mucilage, or rather rottenness, should be able in time to displace and rend asunder whole rocks of stone, and sometimes to cleave them beyond the force of iron wedges,

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so as even to remove mountains! That our tree, like man, (whose inverted symbol he is) being sown in corruption, rises in glory, and by little and little ascending into an hard erect stem of comely dimensions, becometh a solid tower, as it were! And that this which but lately a single ant would easily have borne to his little cavern, should now become capable of resisting the fury, and braving the rage of the most impetuous storms,—

Seneca, Epist.
liii.

magni mebercle artificis, clausisse totum in tam exiguo, & horror est consideranti.

For is it not plainly astonishing, how these minute atoms, rather than visible eggs, should contain the foetus exquisitely formed, (even while yet wrapped in their secundines, like infants in the animal womb) till growing too big for their dark confinements, they break forth, and after a while more distinctly display every limb and member completely perfect, with all their apparel, tire, and trim of beautiful and flourishing vegetables, endowed with all the qualities of the species?

Contemplate we again what it is which begins the motion, and kindles the flame of these *Automata*, causing them first to radiate in the earth, and then to display their top in the air (so different poles, as I may call them, in such different mediums); what it is which imparts these elastic, peristaltic, and other motions, so very like to the sensible and perfectest animal, how they elect, and then introsume their proper food, and give suck, as it were, to the yet tender infant, till it have strength and force to prey on, and digest the more solid juices of the earth; for then, and not till then, do the roots begin to harden. Consider we how they assimilate, separate, and distribute these several supplies; how they concoct, transmute, augment, produce, and nourish without separation of excrements (at least to us visible); how without violation of virginity they generate their like; whilst furnished with tubes, ovaries, umbilical, and other vessels, the principle of any species, they are safely reserved and nourished till delivered: By what exquisite percolations and fermentations they proceed; how for the heart, fibres, veins, nerves, valves, and anastomotas, they are furnished with rind, branches, leaves, blossoms, and fruit; how their colour, taste, odour, and other stupendous qualities and distinct faculties, some of them so repugnant and contrary to others, yet in so uniform and successive a series, are elaborated; and all this performed in the dark, and secret recesses of nature. It is astonishing with what analogy* the solid and inflexible parts of trees agree with the bones, ribs, vertebræ, &c. nay, how the more pliables fitted to such various motions accord with the very

* See Scaliger
Exerc. 14. of
respondent
parts within
and without,
from head to
foot.

brains and marrow. This has induced some to allow them place amongst BOOK IV.
the class of animals.

For their preservation, nature has invested the whole tribe and nation (as we may say) of vegetables, with garments suitable to their naked and exposed bodies, temper, and climate: Thus some are clad with a coarser, and resist all extremes of weather; others with more tender and delicate skins and scarfs, as it were, and thinner raiment. *Quid foliorum describam diversitates?* What shall we say of the mysterious forms, variety, and variegation of the leaves and flowers, contrived with such art, yet without art; some round, others long, oval, multangular, indented, crisped, rough, smooth and polished, soft and flexible; at every tremulous blast, as if it would drop in a moment, and yet so obstinately adhering, as to be able to contest against the fiercest winds that prostrate mighty structures!— There it abides till God bids it fall: For so the wise Disposer of things has placed it, not only for ornament, but use and protection both of body and fruit, from the excessive heat of summer, and colds of the sharpest winters, and their immediate impressions; as we find it in all such places and trees, as, like the blessed and good man, have always fruit upon them ripe, or preparing to mature; such as the Pine, Fir, Arbutus, Orange, and most of those which the Indies and more southern tracts plentifully abound in, where Nature provides this continual shelter, and clothes them with perennial garments.

But with what amazement do we consider what may be demonstrated of their innumerable (and next to infinite) number of seeds, which, in an Elm, for instance, of but one hundred years standing, which suppose to be the ordinary age of that species, would amount to 15480000000.— Suppose then the tree to grow and multiply as many times, and every individual grain to contain a second tree, including the like number, and so on by geometrical progression in squares and cubes. At what a loss must the most enlarged human capacity be at so stupendous a consideration!

Let us examine with what care the seeds, those little souls of plants, *quorum exilitas*, as one says, *vix locum inveniat*, in which the whole and complete tree, tho' invisible to our dull sense, is yet perfectly and entirely wrapped up, exposed, as they seem to be, to all those accidents of weather, storms, and rapacious birds, are yet preserved from avolation, diminution, and detriment within their spiny, armed, and compacted receptacles; where

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they sleep as in their caufes, till their prifons let them gently fall into the embraces of the earth, now made pregnant with the feafon, and ready for another burden: for at the time of year ſhe fails not to bring them forth. With what delight have I beheld this tender and innumerable offspring repullulating at the feet of an aged tree! from whence the fuckers are drawn, tranfplanted, and educated by human induftry, and, forgetting the ferity of their nature, become civilized to all his employments.

Can we look on the prodigious quantity of liquor, which one poor wounded Birch will produce in a few hours, and not be aftonifhed how ſome trees ſhould, in ſo ſhort a ſpace, weep more than they weigh? And that ſo dry, ſo feeble, and wretched a branch, as that which bears the grape, ſhould yield a juice that cheers both God and Man? That the Pine, Fir, Larch, and other refinous trees, planted in ſuch rude and uncultivated places, amongſt rocks and dry pumices, ſhould tranfude into turpentine, and pearl out into gums and precious balms?

In a word, ſo aftonifhing and wonderful is the organiſm, parts, and functions of plants and trees, that ſome have, as we ſaid, attributed animal life to them, and conceived that they were living creatures; for ſo did Anaxagoras, Empedocles, and even Plato himſelf.

* Vide Petri
Mangot. Bot.
Monſpel.

I am ſure Plants and Trees afford more matter for Medicine*, and the uſe of Man, than either Animals or Minerals, are more familiar at hand, and ſafe; and within this late age being wonderfully improved, increaſed and ſearched into, they ſeem, by the Divine Wiſdom, an inexhauſtible ſubject for our diſquiſition and admiration.

† Vide Mr.
Dodart's Hiſt.
de l'Academ.
des Sciences.

There are ten thouſand conſiderations more, beſides that of their medicinal and ſanative properties, and the mechanical uſes mentioned in this Treatiſe, which a contemplative perſon may derive from the Groves and Woods; all of them the ſubject of wonder. And though he had only the Palm (which Strabo† affirms is fit for three hundred and ſixty uſes) or the Coco, (which yields wine, bread, milk, oil, ſugar, ſalt, vinegar, tinctures, tans, ſpices, thread, needles, linen, cloth, cups, diſhes, ſpoons, and other veſſels and utenſils; baskets, mats, umbrellas, paper, brooms, ropes, ſails, and almoſt all that belongs to the rigging of ſhips; in ſhort, this ſingle tree furniſhing a great part of the world with all that even a voluptuous man can need, or almoſt deſire) it were ſufficient to employ

his meditations and his hands, as long as he were to live, though his years were as many as the most aged Oak: So as *Fr. Hernandez, Gracilafco de la Vega*, and other Travellers *, speaking of the Coco, Aloes, Wild Pine of Jamaica, &c. affirm there is nothing necessary for life (*si esset rebus humanis modus*) which these Polychrests afford not.

BOOK IV.

* Vide Raii
H. Pl. l. xxi.
cap. vii.

What may we say then of innumerable other trees, fitted for the uses nature has designed them, especially for timber, and all other fabril employments?—But I cease to expatiate farther on these wonders, that I may not anticipate the pleasures with which the serious Contemplator on those stupendous works of Nature, or rather God of Nature, will find himself even rapt and transported, were his contemplations only applied to the production of a single *Wood*.

Let the farther Curious, or those who may take these wonders for a florid Epiphonema only of this work, add to the most antient Naturalists what they will find improved on this ample subject, in the late excellently learned and judicious Malpighius, Grew, Ray, Senertus, Faber, and others, who have defined these astonishing operations of nature, causes, and effects, with the greatest and exactest *ἀκριβεια* imaginable. But a *wise* and a *thinking* man can need none of these topics; in every hedge and every field they are before him; and yet we do not admire them because they are common and obvious: Thus we fall into the just reproach given by one of the Philosophers (introduced by the Orator) to those who slighted what they saw *every day*, because they *every day* saw them: *Quasi novitas nos, magis quam magnitudo rerum, debeat ad exquirendas causas excitare.* As if *Novelty* only should be of more force to engage our enquiry into the *Causes* of things, than the *Worth* and *Magnitude* of the things themselves.

Cic. de Nat.
Deor. l. ii.

F I N I S.

AN EXPLANATORY TABLE

OF THE

Parts of Fructification of the different Species of Trees described in the SILVA.

Obs. The Parts marked with a Capital Letter are magnified.

The OAK. <i>Quercus (Robur.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. c. The Calyx. In some Flowers it is divided into four, in others into five Segments. B. C. Ditto. d. An Entire Flower. D. Ditto, shewing the situation of the Stamina. e. A single Stamen. E. Ditto. f. A Female Flower. F. Ditto. g. The Acorn, or Nut, as it fits in its permanent Calyx. h. Ditto, separated from the Calyx. i. The Cup, or permanent Calyx.	The ASH. <i>Fraxinus (Excelsior.)</i> POLYGAMIA DIOECIA. a. An Entire Hermaphrodite Flower. A. Ditto. The Flowers have neither Calyx nor Petals, only furnished with two Stamina. B. The two Stamina. C. The Embryo, with its Pointal. C. Ditto. d. An Entire Female Flower. D. Ditto. They likewise have neither Calyx, Petals, or Stamina, bearing only a Pointal. e. A winged Seed. The Seeds of the Hermaphrodite and Female Flowers are alike. f. The Crust opening to shew where the Seed is lodged. g. The Seed.	The WHITE BEAM TREE. <i>Crataegus (Aria.)</i> ICOSANDRIA DIOECIA. a. An Entire Flower. b. The Calyx. c. The Petals, or Flower Leaves. d. The Stamina. e. The Pointals. f. The Embryo, as it fits within the Calyx, with its Pointals. g. The Fruit, or Berry. h. A Transverse Section of ditto. i. A Vertical Section of ditto. k. The two Seeds.	The LIME. <i>Tilia (Europaea.)</i> POLYANDRIA MONOECIA. a. An Entire Flower. b. The Calyx. c. The Petals. d. The Stamina. e. The Embryo, with its Pointal. E. Ditto, with one Stamen and one Petal. f. The Capful. g. A Transverse Section of ditto. h. The Capful as it opens below. i. The Seed. k. A Bractes, or floral leaf.	The SCOTCH FIR. <i>Pinus (Sylvestris.)</i> MONOECIA MONADELPHIA. a. A Male Catkin. b. The Gem, or Winter-Lodge (Hibernaculum). c. The Scale, or Squama. d. A Cluster of Stamina. D. Ditto. e. A single Stamen. E. Ditto, with its Scale c. f. The future Cone. g. A single Scale of the Cone, with its two Embryos. G. Ditto. H. A single Embryo. i. The Cone. k. The same opened to shew how the Seeds are lodged. l. The inner Side of a Scale. m. The two winged Seeds.	The OCCIDENTAL PLANE. <i>Platanus (Occidentalis.)</i> MONOECIA POLYANDRIA. a. A globular Cluster of Male Flowers. b. The Calyx. B. Ditto. c. An Entire Flower. C. Ditto. d. The Petals. D. Ditto. E. The Stamina. F. A single Stamen. g. A globular Bunch of Female Flowers. h. The Calyx. H. Ditto. i. An Entire Female Flower. I. Ditto. k. The Petals. K. Ditto. L. The Embryo, with its Pointal. m. The globular Cluster of Seeds. n. The Receptacle to which the Seeds are affixed. O. A Seed.	
The ELM. <i>Ulmus (Campestris.)</i> PENTANDRIA DIOECIA. a. An Entire Flower. B. Ditto. c. The Calyx. C. Ditto. d. The Stamina. D. Ditto. e. The Pointal, or Female Part of the Flower. E. Ditto. f. The Seed. g. A Branch, at the time of flowering, which happens before the leaves appear.	The CHESNUT. <i>Fagus (Castanea.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. A single Flower. B. Ditto. c. The Calyx. C. Ditto. d. A Female Bud of Flowers. e. A single Flower. f. The Calyx. F. Ditto. g. A single Embryo, with its Pointals. G. Ditto. H. The two Embryos with their Pointals, set in their permanent Calyx. i. The spinous Capsule. k. The same opening at the top to emit the Nuts or Seeds. l. A single Nut.	The WILD SERVICE. <i>Crataegus (Torminalis.)</i> ICOSANDRIA DIOECIA. a. An Entire Flower. A. Ditto. b. The Calyx. B. Ditto. c. The Petals. C. Ditto. d. The Stamina. D. Ditto. e. The Pointals. F. Ditto. f. The Fruit, or Berry. g. A Transverse Section of ditto. h. The Seeds.	The WHITE POPLAR. <i>Populus (Alba.)</i> DIOECIA OCTANDRIA. a. A Male Catkin. b. An Entire Male Flower. B. Ditto. c. The Scale, or Squama. d. The Nectarium. D. Ditto. E. A single Stamen. f. The Female Catkin. g. The Female Flower. G. Ditto. h. The Squama, or Scale. I. The Embryo, with its quadrifid Stigma. K. The Stigma. l. The Capful, or Seed-vessel. L. Ditto. m. Ditto, discharging its Seeds. M. Ditto. n. The Seeds. N. Ditto. o. The Nectarium of the Female Flower. O. Ditto.	The WEYMOUTH PINE. <i>Pinus (Strobus.)</i> MONOECIA MONADELPHIA. a. The Gem, or Winter-lodge (Hibernaculum). b. The Male Catkin. C. A single Stamina, with its Scale. D. The Scale. E. A single Stamen. f. The Immature Cone. g. A single Scale of ditto, with its two Embryos. G. Ditto. H. A single Embryo, with its Pointal. i. A Cone. k. A single Scale with its two winged Seeds. l. A Seed.	The CORK TREE. <i>Quercus (Suber.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. c. The Calyx, in some quadrifid, and in some quinquefid in the Male Flowers. B. C. Ditto. d. An Entire Flower. D. Ditto. e. A single Stamen. E. Ditto. f. The Female Flowers. g. A single Flower. G. Ditto. H. A Vertical Section of ditto. i. The young Acorn or Fruit. I. Ditto. K. A Vertical Section of ditto.	
The BEECH. <i>Fagus (Sylvatica.)</i> MONOECIA POLYANDRIA. a. A Catkin of Male Flowers. b. A single Flower. B. Ditto. c. The Calyx. C. Ditto. d. A Female Flower. e. The Calyx. f. The Germen, or Embryo, with its three Pointals. g. The two Embryos with their Pointals, as they fit in the Calyx. h. The permanent Calyx become a Capful, or Seed-vessel. i. Ditto, as it opens at the top. k. The two seeds.	The HORSE-CHESNUT. <i>Aesculus (Hippo-castanum.)</i> HEPTANDRIA MONOECIA. a. An Entire Flower. b. The Calyx. c. The five Petals. d. The Stamina. e. The Embryo, with its Pointal. f. The spinous Capsule. g. A Transverse Section of ditto, shewing the Partition and Receptacle. h. Ditto, as it opens in three divisions. i. The Nuts or Seeds.	The WILD BLACK CHERRY. <i>Prunus (Cerasus.)</i> ICOSANDRIA MONOECIA. a. The Calyx. b. An Entire Flower. c. The Stamina. d. A single Stamen. D. Ditto. e. The Embryo, with its Pointal. E. Ditto. f. The Berry. g. A Vertical Section of ditto. h. The Stone containing the Kernel.	The MAPLE. <i>Acer (Campestra.)</i> POLYGAMIA MONOECIA. a. The Hermaphrodite Flowers growing on the same bunch with the Male Flowers f. A. An Hermaphrodite Flower. b. The Calyx. c. The Petals. d. The Stamina. e. The Embryo, with its Pointal. E. Ditto. g. A Male Flower without the Stamina, &c. G. Ditto. The Calyx, Petals, and Stamina are the same as in the Hermaphrodite Flowers. h. The two winged Seeds. i. One Wing cut open to shew the situation of the Seeds. k. A Seed.	The QUICK-BEAM. <i>Sorbus (Aucuparia.)</i> ICOSANDRIA TRIGYNIA. a. An Entire Flower. A. Ditto. b. The Calyx. B. Ditto. c. The five Petals, or Flower leaves. C. Ditto. d. The Stamina. D. Ditto. e. The Embryo, with its three Stigmata. E. Ditto. f. The Fruit, or Berry. g. A Transverse Section of ditto. h. The three Seeds.	The SILVER FIR. <i>Pinus (Picea.)</i> MONOECIA MONADELPHIA. a. The Gem, or Winter-lodge (Hibernaculum). b. A Male Catkin. C. A single Stamen, with its Scale. D. The Scale. E. A Stamen. f. The Female Catkin, or future Cone. g. A single Scale, with its two Embryos. G. Ditto. H. A single Embryo, with its Pointal. i. The Cone. k. A single Scale, with its two winged Seeds. l. A single Seed.	
The HORNBEAM. <i>Carpinus (Vulgaris.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. A Male Flower with its Scale. B. Ditto. c. The Scale. C. Ditto. d. The Stamina. e. The Female Catkin. f. The Female Flower with its Scale. F. Ditto. g. The Scale. H. The Petals. H. Ditto. i. The two Pointals. I. Ditto. k. The Petals grown larger, containing the two Seeds. l. One of the Seeds.	The WALNUT. <i>Juglans (Regia.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. Ditto, in its natural size. c. A single Male Flower. d. The Petals. e. The Stamina. E. A single Stamen. f. The Female Flowers. g. Ditto in their natural size. h. The Calyx. i. The Corolla. j. The Embryo, with its Pointals. l. The covering of the Shell. <i>Drupe.</i> m. The Nut divested of its covering. n. Ditto, split open. o. A Kernel.	The MAPLE. <i>Acer (Campestra.)</i> POLYGAMIA MONOECIA. a. The Hermaphrodite Flowers growing on the same bunch with the Male Flowers f. A. An Hermaphrodite Flower. b. The Calyx. c. The Petals. d. The Stamina. e. The Embryo, with its Pointal. E. Ditto. g. A Male Flower without the Stamina, &c. G. Ditto. The Calyx, Petals, and Stamina are the same as in the Hermaphrodite Flowers. h. The two winged Seeds. i. One Wing cut open to shew the situation of the Seeds. k. A Seed.	The HASSEL. <i>Corylus (Avellana.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. A single Male Flower. B. Ditto. c. The Stamina. C. Ditto. d. The Stamina. D. A single Stamen. e. The Female Flowers. E. Ditto. f. Two lacerated Scales that inclose the Embryo with its two Pointals. F. Ditto. g. The Embryo, as it fits in the two Scales. G. Ditto. h. The Embryo. H. Ditto. i. The Nut. k. A Vertical Section of ditto. l. The Kernel.	The SPRUCE FIR. <i>Pinus (Abies.)</i> MONOECIA MONADELPHIA. a. A Catkin of Male Flowers. b. A single Stamen. B. Ditto. c. The future Cone. d. A single Scale, with its two Embryos. D. Ditto. e. The Embryo, with its Pointal. E. Ditto. f. The Cone. g. A single Scale, with its two winged Seeds. h. A Seed.	The STRAWBERRY TREE. <i>Arbutus (Unedo.)</i> DECANDRIA MONOGYNIA. a. The Calyx. A. Ditto. b. The Corolla. c. The same cut open, to shew the situation of the ten Stamina. C. A single Stamen. d. The Embryo with its Pointal, situated within the Corolla. D. Ditto. e. The Fruit. f. A Transverse Section of ditto. g. A Vertical Section of ditto. h. The Seeds.	
		The BIRCH. <i>Betula (Alba.)</i> MONOECIA TETRANDRIA. a. The Male Catkin. b. The Calyx, consisting of three Scales containing three Flowers. B. Ditto. C. The three Flowers with their three Scales. D. A single Flower. E. Its four Segments. F. The Stamina. g. The Female Catkin. h. The Calyx, consisting of three Scales, each Scale containing two Embryos. H. Ditto. i. The Embryo, with its two Pointals. I. Ditto. k. The three Scales, each Scale containing two Seeds. K. Ditto. L. A Seed. L. Ditto.	The HASEL. <i>Corylus (Avellana.)</i> MONOECIA POLYANDRIA. a. A Male Catkin. b. A single Male Flower. B. Ditto. c. The Stamina. C. Ditto. d. The Stamina. D. A single Stamen. e. The Female Flowers. E. Ditto. f. Two lacerated Scales that inclose the Embryo with its two Pointals. F. Ditto. g. The Embryo, as it fits in the two Scales. G. Ditto. h. The Embryo. H. Ditto. i. The Nut. k. A Vertical Section of ditto. l. The Kernel.	The LARCH. <i>Pinus (Larix.)</i> MONOECIA MONADELPHIA. a. A Male Flower. b. The Calyx. c. The Calyx, shewing the situation of the Stamina. C. A single Stamen. d. The Female Flowers, or immature Cone. e. A single Scale, with its two Embryos. E. Ditto. f. A single Embryo, with its Pointal. F. Ditto. g. A Cone. h. A single Scale, with its two winged Seeds. H. Ditto. N. B. This Figure is the American Larch.	The YEW. <i>Taxus (Baccata.)</i> DIOECIA MONADELPHIA. a. A Male Flower. A. Ditto. b. The Calyx. c. The Calyx. D. The Stamina. E. Two Stamina, one viewed in front, the other on the under-side. f. The Female Flower. F. Ditto. G. The Calyx. I. The Embryo, with its Pointal. k. The Fruit, or Berry. l. A Vertical Section of ditto. m. The Seed.	The HOLLY. <i>Ilex (Aquifolium.)</i> TETRANDRIA TETRAGYNIA. a. An Entire Flower. b. The Calyx. c. The Petals. d. The Stamina. e. The Embryo. E. Ditto. f. The Berry. g. A Transverse Section of ditto, shewing the Conceptacle. h. The Seeds. H. A Seed.
		The ALDER. <i>Betula (Alnus.)</i> MONOECIA TETRANDRIA. a. The Male Catkin. b. The Calyx, consisting of four Scales which contain three Flowers. B. Ditto. C. The three Flowers. D. A single Flower. E. The Petals. F. The Stamina. g. A Female Catkin. h. The Calyx, consisting of three Scales, each Scale containing two Embryos. H. Ditto. i. The Embryo with its two Pointals. I. Ditto. K. The Cone, or Fruit. L. The three Scales, each containing two Seeds. m. A Seed. M. Ditto.	The CEDAR. <i>Pinus (Cedrus.)</i> MONOECIA MONADELPHIA. a. A Male Catkin. b. A single Scale, with its Stamen. B. Ditto. c. The future Cone. d. A single Scale of the Cone, with its two Embryos. D. Ditto. e. A single Embryo, with its Pointal. E. Ditto. f. The Cone. g. A single Scale, with its two winged Seeds. h. A single Seed.	The MULBERRY. <i>Morus (Nigra.)</i> MONOECIA TETRANDRIA. a. A Male Catkin. B. The Calyx. c. A Male Flower. C. Ditto. D. One Stamen. e. A Female Catkin. f. A Female Flower. F. Ditto. g. The Calyx. H. The Embryo, with its two Stigmata. i. The Fruit, consisting of many Berries. k. A single Berry. l. A Seed. L. Ditto.	The HAWTHORN. <i>Crataegus (Oxyacantha.)</i> ICOSANDRIA DIOECIA. a. An Entire Flower. b. The Calyx. c. The Petals. d. The Stamina. D. One Stamen. e. The Embryo, with its Pointal. f. The three Pointals. g. The Berry, or Fruit. h. The Stone, containing the Kernel.	

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